THE

CLIMATE OF CANADA

AND ITS RELATIONS TO

LIFE AND HEALTH.

BY

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PREFACE.

Several years ago, portions of the following papers were read before the Natural History Society of Montreal, and formed part of its annual course of Somerville lectures. They were put aside to be added to, improved and cor-

This paper having greatly exceeded its proposed limits. I shall omit, for the present, the Notes in Appendix, to which allusion is made in the text.

upon an exhaustive paper on the exact thermometrical, barometrical or hygrometrical bearings of this country. I have neither the intention to mislead, nor the desire to teach. The meteorological features form a part, a necessary, but perhaps the least important part of the paper. They were introduced to make known to those beyond the confines of this Dominion those thermometric and other conditions, which, in other countries, are so little understood; and which have gone so far to adversely influence opinion in their regard. Having said this, I may state frankly that never was I a meteorologist in the restricted sense of the term; nor do I pretend to the possession of any, even

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PREFACE.

Several years ago, portions of the following papers were read before the Natural History Society of Montreal, and formed part of its annual course of Somerville lectures. They were put aside to be added to, improved, and corrected as leisure would allow. But that leisure never came; neither is it in prospective; and I soon found myself drifting away into the regions of surgery which furnished fewer opportunities of adding to the material then in hand. Many additions, however, have since been made, as professional reading or observation would sometimes furnish. The familiar colloquial style has been preserved, as being more suited, it seems to me, to a promiscuous audience of learned and unlearned. It is, methinks, the more suited to a paper of a fragmentary character, and one having no—and which could possibly have no claim to be considered a complete homogeneous essay on the subject of which it treats.

The reader, therefore, must not suppose he is entering upon an exhaustive paper on the exact thermometrical, barometrical or hygrometrical bearings of this country. I have neither the intention to mislead, nor the desire to teach. The meteorological features form a part, a necessary, but perhaps the least important part of the paper. They were introduced to make known to those beyond the confines of this Dominion those thermometric and other conditions, which, in other countries, are so little understood; and which have gone so far to adversely influence opinion in their regard. Having said this, I may state frankly that never was I a meteorologist in the restricted sense of the term; nor do I pretend to the possession of any, even

of the least portion of that truly surprising knowledge laid claim to by those who, by the pretended study of certain phenomena claim, but fail, to foretell thermometric changes a whole year in advance! Rather do I share the timidity of that staff of observers at Washington, Toronto and elsewhere, who, with returns from a vast number of observers scattered over the whole North American continent; and with a network of telegraphs centering at certain points, venture, but scarcely venture to predict the stereotyped "Probabilities for the next twenty-four hours."

In the first part of the subject—the climate proper—I have made use, without scruple, and sometimes, I fear, without acknowledgment, of the labours of observers who, in many parts of Canada, have endeavoured to record features of meteorological interest.

In the second part, the difficulty has been almost insurmountable. It is this latter part which has most grown under my pen; and which I have had most pleasure in writing. In the first part I do but transcribe; in the second, I found little to transcribe, and had to strike out for myself. It could not be but that some opinions and statements—not originally mine—find expression; and if so I cannot mend it now. They have been digested and assimilated, and I might as well try to give individuality to the grain of wheat, ground and forming part of the loaf whereon I fed at breakfast, as to give to each his due share of praise, if praise there be, in striking for me a thought worth recording, which otherwise might have remained dormant. The late Judge McCord, the late Drs. Hall and Smallwood, all cherished personal friends, furnished me much material for the first part of my paper, and more than once urged me to give my observations to the public; and the late Bishop Fulford, of respected memory, under whose presidency the lectures were delivered, considered it to be my duty to give such information as I possessed. The approaching visit of the British Association for the

Advancement of Science, which has done me the distinguished honour of naming me Vice-President, causes me to wipe the dust from my manuscript and to confide it, in synopsis at least, to its members, and perhaps to the printer, with such slight touches as additional information may have afforded.

In the second part of my subject: The Relations of this Climate to Health and Life, I have had no writer to consult; none to follow; from none to differ; for, while the resources—the boundless natural resources—of this country have had numerous explorers, allusions to our climate have been hasty and often unfair statements of those more sensible features which are first noticed by the traveller or excursionist; and which are most misunderstood.

It is not, it cannot be denied that very vague and indefinite impressions are entertained with reference to the climate of Canada and to its influence on the economy-notions which have been confirmed by hasty travellers who have come and gone, and who have related as among the marvellous, what they saw and felt while here. Canada has, in this way, come to be regarded by many, as a most ungracious, trying, and exhaustive climate. I need only, in illustration, direct attention to the geographies and histories until lately in use in the schools. It may be, that, to counteract those erroneous impressions, patriotism, with me, may have had a too full scope; but I have endeavoured with singleness of purpose to trace the peculiar meteorological features with fidelity, and to indicate their influence upon us.

There are some subjects upon which, though their general principles are clear, it is extremely difficult to be precise, and the present is one of them. It is only those who have attempted to write on the subject that can be aware of the difficulties of the task. This is the experience of those who have had the most favourable opportunities for the work—access to the best libraries; infor-

mation from numerous observers; friendly intercourse with those scientific auxiliaries whom European society can so well furnish; and leisure for the work. Much more difficult is such a task for one who, busied in the daily avocations of a laborious profession, attempts, at irregular intervals, and of short duration, to deduce general conclusions from such defective special information as industry alone can procure; for the life of a surgeon in Canada, it is hardly necessary to state, is cut up into a thousand little fragments, in which he is always attempting to accomplish what he cannot; and to finish what he has scarce time to begin.

Yet no subject more than Climatology requires access to official records, and leisure for their arrangement; for the observations of those who devote themselves to the subject of Meteorology are often recorded in widely distant local periodicals.

Isolated facts, as such, are useless in this as in other sciences; and it is only when multiplied, and compared with others, they obtain any value.

A subject comprising such various elements as climate has not yet received, even in Europe, a position which entitles it to be regarded as a positive science; while in Canada the observers have been too few; the results of their observations have not been properly averaged; and even the averages obtained have been too much influenced by the extremes. The instruments used by observers in one section of the country do not always agree with those used in another; and the records of observers, even in the same locality frequently disagree. Thus, while instability is apparently the characteristic feature of climate, instability seems to characterize many observers; and Meteorology is still regarded as the most equivocal and uncertain branch of natural philosophy—nay, as beyond the pale of philosophy altogether. Generalizations alone are allowed, while in many instances even

generalizations are regarded as anomalies, and the deductions therefrom as unreliable—if not erroneous.

Every science has its period of infancy—but the science of Meteorology seems to have leaped from it at once into maturity by the aid of that universal genius, Humboldt (who has left the impress of his wonderful intellect upon every branch of science), and Sir Wm. Herschel. Humboldt and Herschel caused observations to be so multiplied that something like a system has been formed from them. And during the last few years a rapid approach has been made towards generalization. Bache, Redfield, Blodgett and others, in the United States, have continued the work; while Canada, in the persons of Judge McCord and Mr. Skakel, the pioneers of Canadian Meteorology, Col. Sabine, Capt. Lefroy, Dr. Kelly, Prof. Cherriman, Dr. A. Hall, and Dr. Smallwood (whose diligence and accuracy have earned for him the foremost rank among meteorologists), with other local observers, has already furnished a series of observations which will enable us to form a fair conception of the climatological features of this country. Sir John Richardson, Prof. Hind, Sir George Simpson and many of the factors of the Hon. the Hudson's Bay Company; Scoresby, Parry, Sabine, Franklin, Sir Jas. Richardson, Capt. Waddell and Sir James Ross, who, as Humboldt says have displayed a perseverance of which we scarcely find a parallel in the history of human exertions, complete the chain of meteorological evidence from the Arctic to the Atlantic and Pacific—"from the happy zone of the olive, to the climate where the soil is covered with lichens." And now the Canadian Parliament, ever quick in words of promise, and sometimes slow in thought and action, are making provision for the establishment of a system of meteorology in Canada, by causing every grammar school to be provided with a barometer, one thermometer for the temperature of the air, one hygrometer for evaporation, one rain-guage, one wind-vane, and "it shall be part of the

duty of every county grammar school to keep a meteorological journal, which shall be presented annually by the Chief Superintendent of Education to the Government in his annual report."

In speaking of the differences between the diseases of Canada and those of Europe I may have been more decided than might appear warrantable; but, in extenuation, I may say, that from my connexion for many years, as surgeon, with the largest hospital in Canada, receiving within its walls every nationality, and more especially those nationalities which form so large and distinctive a portion of the inhabitants of this part of the country, something almost akin to dogmatism was with difficulty kept under, for, with Virchow, I may say:—"Nichtsdestoweniger bekenne ich offen dass es mir nicht möglich ist mich ganz zu entsubjectiviren. Mit jedem Jahre sehe ich immer wieder von Neuem, dass ich selbst an solchen Stellen, wo ich geglaubt hatte schon ganz objectiv zu sein, immer noch ein grosses Stück subjectiver Vorstellungen bewahrt habe."

As I was desirous of ascertaining the views of the members of my profession generally upon certain questions discussed in the second part of the paper, I addressed to many, if not to most of the abler members of it, a series of questions for a report of their opinion. Very few replied; and those who did were so little in accord with each other that I was left precisely where I was before. There was no disturbance of the deductions I had already made, and which I had given, to those most competent to do so, a fair opportunity to discuss, perhaps, to refute. There was a singular unanimity, however, in the replies to a question *not* put by me: that little or no attention had been given by them to the subject. As little or no attention had been given to what I consider a most interesting, though a neglected subject of medical enquiry, so far as this country is concerned, I placed my paper before the

Medico-Chirurgical Society of Montreal, at one of its meetings, and as is usual with papers on almost every subject brought before gentlemen whose individuality, on such occasions, is somewhat marked, praise and dispraise were dealt out with generous hand. But the deductions were left unquestioned. Having said this much, I have only to add that one motive, and one alone, have I had in placing the following paper before the public: that as little—very little—had been written on the subject; and as what had been written had been in disjointed sentences in the journals of those who had visited the country, I felt I should contribute something, however trifling, to allow a ray of light, however slight and feeble, to fall upon a subject which has hitherto received no serious attention save such as has been, in great measure, of a nature to mislead.

It is difficult, in a paper of this kind, to decide how far one should depart from the subject-proper to afford explanations as one proceeds. To most of my readers, as it was to most of those present, when my paper was read, any elementary instruction would be tedious; while there are many who are not supposed to have devoted much time to the study. To the latter, then, I shall particularly address myself in the Introduction, and the initiated may pass it over altogether. Those who are already acquainted with the physical qualities of the climate of Canada will do well to pass over Part I.; and those familiar with the influence of climate in general on the economy need not be detained at the Introduction.

INTRODUCTION.

Whoever considers climate with reference to its vast importance to human welfare, must feel some degree of disappointment at the meagreness of result in which the advanced state of knowledge in the Nineteenth Century has left this most interesting branch of enquiry.

What is climate? The ancients understood by climate that obliquity of the sphere with respect to the horizon from which results the inequality of day and night—or, in other words, the spaces between the imaginary circles parallel to the equator, drawn in such a manner over the earth that the longest day in each circle is half an hour longer than the preceding. This would make twenty-four climates—from the equator, where the longest day is twelve hours, to the polar circle where it is twenty-four hours. But we have now come to regard climate as the weather peculiar to a given country; the heat and cold; dryness and moisture; the course and character of the winds; salubrity and insalubrity; and the changes of the seasons "The term climate," says Humboldt, "taken in its most general sense, indicates all the changes in the atmosphere which sensibly affect our organs, as temperature, humidity, variation in the barometrical pressure, the calm state of the air, or the action of opposite winds; the amount of elastic tension; the purity of the atmosphere or its admixture with more or less noxious gaseous exhalation; and, finally, the degree of ordinary transparency and clearness of the sky, which is not only important with respect to the increased radiation from the earth, the organic development of plants and the ripening of fruits, but also with reference to its

influence on the feelings and mental condition of man." One philosopher will view climate as any space distant from the equator and poles; another, as nothing more than a well arranged table of the winds, and of the thermometric, barometric, and hygrometric degrees; a third, as having reference solely to elevation above the mean level of the earth's surface; a fourth, as consisting only of the internal heat of the globe; while a fifth, supposed to be better informed than all the rest, pronounces climate to be the outcome of latitude and local elevation, and allows it to be but slightly affected by any other causes. But a more exalted view of the subject is taken by Cannabis, who styles it "l'ensemble de toutes les circonstances naturelles et physiques, au milieu desquelles nous vivons dans chaque lieu."

Affecting and influencing climate in every locality there are various conditions which may, however, be reduced to two: distance from the equator and height above the level of the sea. There are other causes in operation to which I shall allude presently. To one, however, I shall refer just now, as opportunity presents itself, namely, the existence of a source of temperature within the earth itself independent of the sun, illustrated by the high temperature of the water of deep wells and hot springs—of which we have many in Canada.

Heat is the controlling condition of all climates. The source of heat is the sun; but the interposition of the atmosphere modifies all the effects of the sun's rays.

The sun causes the invisible vapours and cool air to rise. Becoming warmer they become lighter; and becoming lighter they soar into the atmosphere, and their places are supplied by cooler air. *Zones* which were long in vogue have really no place in nature, and have given place to isothermal lines—lines passing through places where the mean temperature of the air is the same.

Were the earth possessed of a smooth even surface; were its crust composed of the same uniform material; and were it deprived of an atmosphere, there would be a climate of equal temperature bearing a definite relation to the sun's influence. But the crust of the earth, as Dr. Drake remarks, is not uniform in chemical composition or surface: it abounds in mountains, plains, and valleys distributed in a very irregular manner; portions of it are densely overshadowed, while others are destitute of forest; the larger part is covered with oceans, lakes, rivers and swamps; and an elastic atmosphere rests upon the whole; and every part, solid, fluid and aëriform, is permeated by electricity. Were the earth, with this surface, removed from the influence of the sun, the phenomena of climate would be annihilated. In that luminary, therefore, reside the forces on which they depend; and the rays of heat and light are efficient agents by which the sun's quickening influence is exerted on the earth. When they reach its surface their effects are substantially according to the angle of incidence; but falling on material elements so diversified, a great variety of movements are generated, and results or phenomena the most complicated, are incessantly developed. Thus unequal degrees of heat are accumulated in portions of a continent having the same latitude but at different elevations; or, as they are covered with forests or destitute of shade. The heating and cooling of the land and water do not proceed according to the same laws; aqueous vapour is raised into the air from the oceans and transported over the continent by winds generated by the unequal heating of the atmosphere, to be condensed and precipitated on regions remote from those in which the evaporation took place; in the condensation of vapour, caloric is liberated; by the evaporation of fallen water it is absorbed; the clouds intercept the rays of the sun and limit their effects upon the surface, but, at the same time, arrest and throw back much of the caloric which radiates from

the surface; dead calms and hurricanes rapidly succeed each other; electrical phenomena are generated; the luminous solar rays are decomposed by the clouds, which they tinge with various colours; finally, different gaseous exhalations from decomposable matters lodged on the surface, and all those products of combustion, respiration, and decomposition which surround the haunts of men and animals ascend into the atmosphere. From this it will be inferred that the difference in temperature observed in parts of the country under the same latitude, and at the same elevation above the sea, could not, as Sir John Leslie observes, "arise from the trifling influence of mere local peculiarities, but must depend on more general causes; as the form of continents, the nature of the surface, and especially on their size, position, and proportion to the adjacent seas." The elements of climate, therefore, are not always the same in different regions of the globe, but bear an intimate relation to the physical geography of a country—a relation which all may appreciate, though not easily define.

Were we to observe attentively what passes around us, the view must necessarily be narrowed; and any attempt at extending the horizon could only be secured by a multiplication of isolated facts which would be out of place anywhere, even if they served to furnish general maxims. To describe the climate of a country, is, with meteorological tables before us, a matter of no difficulty. But to trace, in a coherent and intelligible manner, the connection between a given climate, as furnished by statistical and meteorological tables, and the life and health of its inhabitants, particularly when vital statistics are meagre and unreliable, is an undertaking, the magnitude and difficulty of which appal me even at the outset. But apart altogether from statistics, or to make use of them when found, one must, on the one hand, either be familiar with, and take cognizance of, almost every science and art into which

these subjects branch; or, on the other, close his eyes to, and cut short his investigations when new characters, or the same characters in new dresses, appear before him. The former course would lead to regions of wild and fanciful speculation—the latter would present to the vision an impenetrable veil.

There are certain forces, or laws, or whatever they may be called, which lie at the bottom of all science, sanitary and meteorological, as well as astronomical; but he who tries to connect them, in his mind, with every phenomenon which it enables him to understand or to explain to others—such as catarrh, with certain conditions of the atmosphere; or *Cholera du pays*, or its more formidable Asiatic prototype, with some fancied or noticed electrical disturbance or ozonic influence—will not be slow to acknowledge that if those facts are alone to be admitted as such, the relations of which to others can be clearly traced, few indeed would be the facts received. No one has yet been found with a mind so comprehensive as to take in all the facts relative to sanitary science in connection with meteorological deductions, and to invest their predictions with anything approaching to that precision which the nature of the science seems to demand. Indeed, the facts are not always the same; and the language in which they are stated is oftentimes obscure and unintelligible. Then there are influences, general influences, which no observer can adequately recognize, or who can measure their power, or ascertain their duration or limit. And besides those general influences, there are local influences which supply an atmosphere of their own, independent of air, or earth, or sky, or winter's cold, or summer's heat.

As an illustration:—Intermittent fever is generally met with in low damp situations, near swamps, marshes, ponds, lakes, or sluggish streams; and rarely or never on high and dry land, or by swiftly flowing water. Here we have certain *data*, good, so far as they go. But they are

rendered almost nugatory by the fact that *tertian* is not invariably met with in low marshy grounds. The season of the year; the neighbourhood of hills, lakes, rivers, forests, and the nature of the soil, etc., have their influence, generally, but not always; for the individual subjected to those influences may have been so saturated with the disease at a former period as to be proof against a new attack; or the *vis medicatrix*, given to different persons, in different proportions, may be sufficient to shield him, more or less, from their operation. It would seem as if this branch of medicine must ever remain to some extent conjectural; that, as Dr. Ferriar remarks, "nature, as if in ridicule of the attempt to unmask her, has reconciled contradictions and realized improbabilities with a mysterious versatility, which inspires the true philosopher with diffidence, and reduces the systematic to despair." He who "endeavours to comprehend the phenomena of physical objects in their general connection, and to represent nature as one great whole, moved and animated by internal forces," would require that extended knowledge of the various branches of science to which an universal genius such as Humboldt might perhaps venture timidly to aspire.

Yet notwithstanding the difficulty of tracing the connection, writers have, at all times, recognized a relationship between the climate of a country and its inhabitants: "As the air is, such are our humours. It offends commonly if it be too hot and dry, thick, fuliginous, cloudy, blustering or tempestuous." "Residents of warm climates," says Leo, "are ordinarily so choleric in their speeches, that scarce two words pass without railing or chiding in common talk, and often quarreling in the streets." "Cold air," says Montaltus, "is almost as bad as hot, and the people of northern countries are generally dull and heavy." "In a thick and cloudy air," says Lemnius, "men are tetric, sad and peevish; and if the western winds blow, and there be a calm, or a fair sunshine day, there is a kind of

alacrity in men's minds; it cheers up men and beasts; but if it be a rough, heavy, cloudy, stormy weather, men are sad, lumpish, and much dejected, angry, waspish, dull and melancholy." "The medicine must needs be good," says another, whose name I cannot recall, "when the air is temperate, serene, quiet, free from fogs, fens, frosts, and all manner of putrefaction, contagious and filthy, noisome smells." The Egyptians, according to Leo Afer, are a conceited and merry nation, which is ascribed to the serenity of the air. Carden says: "they that live in the Orcades are of fair complexion, long lived, most healthful, free from all manner of infirmities of body and mind by reason of a sharp purifying air which comes from the sea." Waller, in his "Battel of the Summer Islands," thus recognizes the influence of climate:—

> "So sweet the air, so moderate the clime,
> None sickly lives, or dies before his time,
> Heaven sure has kept this spot of earth uncurst,
> To show how all things were created first."

Dr. James Johnson thinks "the influence of climate, not only on the complexion, but on the whole organization of man, as well as of animals and vegetables, is now unquestioned." And Raciborski, fearing lest the principles which he advanced might not be applicable to countries which he did not know, introduces this saving clause: "Vivo et scribo in *aère Romano*."

Climate and physical circumstances, says Malte Brun, in addition to original difference of race, have exercised their wonted influence on the character of the Indian population. In the flat, hot regions of Bengal; on the shores of the Ganges, and amidst the meandering of its tributary streams, is to be found a timid, gentle, pacific race; educated, but prone to superstition; servile to their superiors, but tyrannical to their inferiors; obsequious, yet treacherous; skilled in the arts of eastern adulation, but mild and inoffensive in their intercourse with each

other. In the elevated regions of the Peninsula, on the other hand, on the high table-land of the Mysore, in the wild hills of Almorah, on the lofty mountains of Nepaul, the inhabitants are brave, daring, and impetuous ; glowing with ardour, chivalrous to women, courteous to strangers, glorying in deeds of heroism, faithful in friendship, vehement in hatred.

The intimate connexion between the ratio of mortality and the physical geography of a country is recognized by statisticians generally. The Registrar-General, in the reports of the Births, Marriages and Deaths in Scotland, for instance, in explanation of certain phenomena connected with the death-rate at certain seasons, and in certain places, is accustomed to say :—Scotland is of an extremely irregular figure, and its mainland is so broken up by promontories and indented by bays or firths, that even at its most solid part there are few points which are more than forty miles distant from the sea. And the *Times*, in a critique, admits the connection when saying :—"There is neither conceit nor irrelevance in the matter."

I have introduced these extracts—and I might have greatly multiplied them—as a prelude to the statement that climate influences our minds and bodies ; affects our stature, strength and complexion ; causes and cures diseases ; prolongs or shortens life. Its influence may be seen in the light-haired, fair-skinned Caucasian ; in the copper-colored, black straight-haired North American Indian ; in the thick-lipped, curly-headed negro ; and in a great variety of intermediate races—all descended from one common parent—the theories of the pluralists* to the contrary notwithstanding. As a fair illustration of this

* Did the Almighty originally create but one man and woman, or many, and if so, how many? Some persons, in the vanity of misunderstood science, assert the latter; but science is not all on one side, for Cuvier, Blumenbach, Pritchard, and others affirm the unity of the human race; and an authority far higher and far more ancient than any human has regulated this question in a manner I am not disposed to doubt.

assertion, I may instance the Jews, about whose paternity there can be no doubt. The Jews are descended from Abraham, and the dark penetrating eye, dark hair, and brunette complexion are usually regarded as three of their more distinguishing features. But in the north of Europe there are many with light sandy hair, fair complexion, and light eyes. As we proceed southwards they become darker and darker; and when we arrive in India, they cannot be distinguished, in colour, from the almost black Hindoo among whom they have dwelt for several centuries; and the length of time they have been resident, and the number of generations of tropical birth, may be roughly estimated by their gradations of colour. Equally striking are the features of their old task-masters—the Egyptians. As we travel from Egypt towards Negroland there is a regular progression of colour which is altogether independent of the mixture, and may be called geographic. The inhabitants south of the great desert of Korosko are much darker than those on the northern side, and the hair is remarkably curly. The Arabs are dark in direct ratio to their proximity to the equator, and M. Tremaux has found the Foun or Founzi with skin as black and hair as curly as the Negro, with faces of a decided African type. The Arabs occupy the country between the Negroes and Founs, but only for a few centuries. They, as well as the Founs, are in constant hostility to the Negroes, and the latter are invariably sold and sent north when taken prisoners. There is no mixing of races, yet the solar rays are gradually removing all shades of distinction, and the circumstance most strongly corroborative is the fact that those who have been longest exposed to the meridian, most nearly resemble the Negro. Thus the Founs have been longer in Negroland than the Arabs, and are darker; and the Barbs, who have been longer than the Arabs, and not so long as the Founs, hold an intermediate place in colour and in character.

But the influence of climate, proper, is most evident in circumstances where it is least hindered by other conditions—as in the case of those most exposed to it—the Aborigines—and here again the physical features of the country have peculiar influence.

In some instances, it does not require the long-continued operation of climate to effect changes the most marked. Those versed in ethnographical questions inform us that English women in Sydney, Australia, who have had portions of a family in England, but who had ceased to bear children, after arrival in Australia sometimes again become prolific and have children; but the effect on their minds of the new order of things is like that on Laban's sheep—their offspring in Australia are totally unlike what had been born in England. The latter were light-haired, fair, rosy, plump, English-looking—the Australians were dark, straight-haired, and of more serious countenance, resembling, in some respects, their elder brothers less than they did the people among whom they were now living. Here we have a marked example of the modifying influence of climate and social circumstances on the outward physiognomy. But soil and climate also affect the national character—materially when the inhabitants are in a rude, uncultivated state; and, but partially, when their social condition is more elevated—for civilization is constantly developing latent intellectual endowments and their resulting phenomena, making individuals to differ from those that preceded them, when these were placed in circumstances less favourable than were those to mental development; and distinctions which were at first *material* at length become intellectual.

Man, in his migration over the earth's surface, is subject to much vicissitude and change, while nature continues to operate by definite and unvarying laws, leaving him to modify and mould himself to their operation, but not to alter them. Climate, therefore, as understood in its re-

stricted sense is, as de Bonstetten says, "but one of the many causes that affect man. Its influence, though always operative, is felt gradually through effects which sometimes would appear to be foreign to it."

But there is still a third element affecting man in health and disease, and influencing all tables of mortality; and one, moreover, of great potency—the ordinary condition of wealth and comfort.

Gibbon says, and nearly every physiologist believes, that man is better adapted than the inferior animals to bear those changes of temperature, and of other qualities of atmosphere, consequent on a removal from one climate to another. But for this boasted prerogative may we not say he is more indebted to the ingenuity of his mind, than to the pliability of his body? Were man, in a state of nature, deprived of the power of protecting himself, at the expense of other inferior animals, against the external influences of climate, he would be the least likely to survive transplantation.

"L'homme est une intelligence servie par des organes," and to him alone it is given to

> ——"study well the clime,
> Would to *its* manners *his* obsequious frame
> And mitigate those ills he cannot shun."

His mental faculties, then, supply his wants, yet Nature, is not inoperative. His mental faculties must do for him what Nature does for the rest of animated beings. And with what success he can accommodate himself to vicissitudes of temperature, the healthy residents of this country can sufficiently attest. But even where those vicissitudes are greater, Afghanistan for instance, where the temperature varies suddenly; where, in the Khosk Mountains in the plain of Peshawur, beneath, the thermometer is 115° in the shade; and where the temperature is not uniform, but depends on the respective levels and the direction of the

winds; and where the seasons change much more rapidly than in Canada, the climate is healthy, and pliant man, because he is pliant, is strong; and though lean, is bony and muscular.

To the influence of climate on the human race I have already directed attention—an influence seen in the great variety of human beings now peopling different regions of the earth. Although Mr. Latham says: "that any amount of inter-tropical influences can convert a white man into a negro is what many deny, and that on reasonable grounds; * * * * * * and that any degree of Arctic cold can convert a negro into an Eskimo (Esquimaux) is in like manner doubted; neither is the possibility of two such extreme powers being developed out of the intermediate one freely admitted." In other words, the effects of climate upon the human frame are by no means held to be indefinite.

The influence on the brute creation is admittedly more marked than on man; and the changes are the more easily recognized after a few years, than in man after as many generations. If we translate the common sheep dog to the south he will have lost, in a few generations, his rugged coat, and be clothed, instead, in soft, silky, shining hair. The tender and innocent sheep, when transported from the inclemency of the north, to pant under the vertical sun at the equator, will, in a few generations, exchange its warm fleecy wool for a much more convenient coat of hair. The Egyptian dog when brought, in all his nakedness to Canada displays, after a short residence, a few dry straggling hairs upon his skin; but in a few years, should he survive that length of time, a moderately comfortable coating of hair protects him from the cold. The Esquimaux dogs, so valuable to the dwellers of the northern part of this country, resemble but little any of the European species from which they are descended. They are furnished with a coating of hair which enables them

to resist any degree of cold to which they are exposed. They were not so at first. (As a result of education or of imitation, it may be observed, they were never heard to bark till they had acquired the accomplishment from their European cousin.) A difference more marked is observed to occur, in a few months, in the domesticated animals. As winter approaches, the fur—as in the case of the horse and other animals—becomes thicker, and coarser, and longer—a change which warm lodgings and an artificial covering effectually prevent. While the hair and plumage of many animals and birds undergo marked changes in colour and density.

Observing those influences on the brute creation, can we, the most sentient of all animated beings, deny a participation in them? No! The operations of climate, as it has been shown, on the brute creation, are extended to man. They may be seen in the North American Indians, who differ so widely from the inhabitants of the old world whence they undoubtedly came. May they not be seen also, to some extent, in the physiognomies of our American cousins, who, in some respects, recede from the European type as they approach the true American.? But one or two centuries have elapsed since they separated themselves from a great branch of the European family; yet what a marked change has already occurred in their general appearance! The hair has become straighter, coarser and darker; the cheek bones so prominent that no amount of fat conceals them; the complexion has become more sallow, and the voice has acquired a peculiar nasal twang—attributable by some to the climate—by others, to piety. (The nasal twang is one of those distressingly lazy sounds which grate upon the ear so harshly. It might die out did not Europeans of a certain class so readily adopt it, unconsciously sometimes from imitation, and also from a notion that it is fashionable, if not elegant!) So marked is this change, that it is stated by some, and believed by many,

that were the southern and western portions of this continent not fed by a constant influx of European blood, the inhabitants would soon resemble, in face, figure and voice, the Aborigines of the soil. Of course if such changes should occur, they would be more generally observed in those who are constantly exposed to the sun's influence—the tillers of the soil and out-door artisans. The inhabitants of cities who live in-doors, and who preserve the pallor of their countenances by hugging the shady side of streets, would be less influenced. The industry which the erection of cities evidences is here apparently more powerful than Nature; but "whenever Nature is mo powerful than industry, whether for good or for bad, man receives from the climate an invariable and irresistible impulse."

PART I.

It is difficult to condense a description of the climate of such a country as Canada—so vast in extent, and so diversified in surface and physical characters; with local diversities ever and anon occurring to disturb the harmony of the general whole. But a cursory view is not unnecessary as a preface to a consideration of its influence on those who are exposed to it. The severity of our Canadian climate is very much exaggerated and misunderstood by Europeans and others; and even the thermometer in the dry, clear, bracing atmosphere, in winter; and in the almost equally dry temperature of summer, is at best an imperfect guide to those accustomed to its ranges in the raw, cold winters; or in the damp, warm, sultry summers in Great Britain and the west of Europe generally. I shall, therefore, hastily run over the principal physical features of the country as they affect climate, making a few comments on each of them—like the traveller who, unable to remain long in a country, ascends the hill-top and takes a hasty survey of the whole.

Physical Geography.

Old Canada proper, at the time of which I wrote, extended from Gaspé in the Gulf of the St. Lawrence in the east, to Sandwich or Windsor in the west, a distance of about 1100 miles. But that is not the Canada of which I speak to-day. By Canada I mean *all* the territory under British rule (whether immediately governed by our Cana-

dian Parliament or the Hon. the Hudson Bay Company, matters not) extending from the Atlantic in the east, to the Pacific in the west; and from the Arctic Ocean, Baffin's Bay and Davis' Straits in the north and north-east, to the boundary line 45° and the great chain of lakes in the south and south-east. This, the Canada of the future, occupies a great portion of what has been styled the interior valley of North America. As this valley is of great moment in a climatological point of view, I shall briefly describe it. If we assume 8,000,000 square miles as the area of North America, this valley may be estimated at 6,000,000 square miles. Beginning within the tropics, it terminates within the polar circle—traversing the continent from north to south, and passing through the entire northern zone. In the south, it rests upon, and is indented by, the Gulf of Mexico; and in the north by the Hudson Bay. These approach within twenty-two degrees of latitude of each other. This valley is protected from the Pacific Ocean, in the west, by the Rocky Mountains—mountains which, varying from ten to fourteen thousand feet in height, begin beyond the polar circle, and end in the Mexican Cordilleras within the torrid zone.

The Appalachian chain of mountains, extending from the 33° to the 53° of north latitude, bounds this valley in the east. This chain runs, in a north-easterly course, parallel to the western shore of the Atlantic. It is one-third the length and one-fourth the height of the Rocky Mountains. The chain is interrupted at the forty-second degree of latitude by the great lakes and the St. Lawrence. The interior valley, therefore, is more influenced by the Atlantic Ocean on the eastern, than by the Pacific on the western side.*

*Prof. Eliot, while recognizing local influence, says it is surpassingly slight, and that the Appalachian ranges merely reduce the temperature of their own atmosphere without disturbing the uniformity of the districts which they divide physically.

The northern side of this somewhat quadrangular valley is a great flat, and receives, unopposed, the full benefit of the Arctic Ocean and Hudson's Bay; while the south, as already stated, rests upon, and is indented and influenced by the Gulf of Mexico, with the Mississippi, Missouri and a number of other rivers flowing into it. The south-western third of the valley is nearly destitute of lakes; while the other parts present them in almost countless numbers. The smaller lakes are distributed without any apparent order. The larger present a chain of unrivalled magnitude, and run in a south-easterly direction.

This valley contains the basin of the St. Lawrence, with its enormous fresh-water lakes. The basin of the St. Lawrence is about 900 miles in length. It has an area of 530,000 square miles, and contains lakes having an area of about 130,000 square miles; being, in round figures, about one-fourth of the whole hydrographical basin—the land occupying the remaining three-fourths of the whole area.

This basin is hemmed in on both sides by mountain ranges: the Laurentides on the north; the Mountains of Notre Dame on the south. These mountain ranges keep close to the margin of the river until within a hundred miles of Quebec, where that on the southern flank leaves the river, and at Montreal it is about fifty miles from the southern bank, and now forms the Vermont Mountains.

The northern range keeps to the river margin much further west. It leaves the river margin twenty miles below Quebec, and gradually increases its distance from the margin of the St. Lawrence; forms the high ranges thirty miles north of Montreal; extends along the north side of the Ottawa River for a hundred miles; thence to the Thousand Islands; thence to the southern end of Georgian Bay; thence to the eastern and northern shores of Lake Huron and Lake Superior; thence northward to

the Arctic Ocean. Sir Wm. Logan estimated the distance of the whole course of the range, from Labrador to the Arctic Ocean, at 3500 miles.

These ranges vary in height. Those of the Saguenay are "stated to attain to a height of 4000 feet above the sea." The Eboulements are not more than half that height, according to Admiral Bayfield. As we proceed westward, these mountain ranges appear higher, from their abrupt elevation near the lake; but this in reality is not so. The Laclochc Mountains, for instance, do not exceed 1000 feet in height, though appearing much higher. Sir Wm. Logan and Dr. T. Sterry Hunt give a general elevation to the Laurentides of 1500 to 1600 feet. They are covered, for the most part, with evergreen spruce and pine.

These ranges are composed of sedimentary rock; the northern range presents the more crystalline character, and is the more ancient—indeed, the oldest known stratified rock. It is of the Azoic; while the southern is of the Palæozoic era. The former is composed of "two series of rock—the Huronian and the Laurentian—the former overlying the latter."

Of the geology of the country little further need be said. According to Sir Wm. Logan, Canada consists, for the most part, of Laurentian, Devonian and Silurian rock. About one-fifth of it is fossiliferous, or productive; and four-fifths are unfossiliferous, or unproductive.

At different heights along these mountain ranges, numerous watersheds of greater or less extent are met with, the waters from which, collected into ponds or lakes, find their way through gorges to the river, and thence to the ocean.

The watersheds of the southern range of the St. Lawrence valley average 650 feet in height—the lowest (Temiscouata) being 467 feet, and the highest (St. Francis) 890 feet, while the hills which surround them average 250 feet.

The lakes and sheets of water of the northern range are innumerable. They "bespangle the whole area."

Beginning in a *cul de sac* formed by the Arctic Ocean and the Rocky Mountains, and near the Arctic circle, in the North-West we have, in west longitude 127°, Great Bear Lake. The lacustrian chain stretches towards the south-east. A number of smaller ones are met with having intervening straits, which connect them with Great Slave Lake in 110° to 116° west longitude and 52° north latitude. Then follow, in the same range, Lakes Athabasca, Wollaston and Deer; then one of larger size, Lake Winnipeg, having an area exceeding 9000 miles, and draining a valley having an area of 400,000 square miles. Then follow Lake of the Woods, connected with the Winnipeg River and a considerable number of smaller lakes.

The surplus waters of the lakes and rivers further north flow into the Arctic Sea. Lake Winnipeg flows through Churchill and Nelson rivers into Hudson's Bay; the other and larger lakes flow into the St. Lawrence.

The lakes already mentioned—although the smaller of them are larger than the largest lakes in Great Britain—are yet small when compared with those that now follow. The chain we have been considering brings us by a continuous water route to the large basin of clear water, Lake Superior—the largest, yea, by far the largest, fresh water lake in the yet discovered world. It has an area of 32,000 square miles and a mean depth of 900 feet. Then comes Lake Huron with an area of 20,400 square miles and a mean depth of 1000 feet. Then Lake Michigan, which, although altogether American, assists in modifying our climate; and lastly Lakes Erie and Ontario.

Only the larger watersheds have been noticed; but their huge magnitude may be gathered from the statement that five of the larger—Lakes Ontario, Erie, Huron, Michigan and Superior—have an aggregate area of 98,079 square miles, and a depth varying from 500 to 1000 feet.

The smallest of them is tossed by tempests like the ocean; and all the navies of the world might float upon the bosom of the large Huron or the larger Superior for days in succession without being seen by each other. They feed the mighty St. Lawrence, which, at Montreal, according to the competent authority of Mr. John Kennedy, passes down the river at ordinary low water at the rate of 20,000,000 cubic feet per minute; at ordinary high water, in May, 35,000,000 cubic feet per minute; at very high water, when the wharves are flooded, in the latter part of May, 41,000,000 cubic feet per minute; and pours into the ocean between fifty and one hundred millions of gallons a minute, without suffering diminution.

These fresh water seas, together with the St. Lawrence and the smaller lakes and rivers, cover an area of 130,000 square miles, and contain nearly one-half of all the fresh waters on the surface of the globe!

The Ottawa River has its source at, if not beyond, Lake Temiscaming; has a course of 1800 miles, and a basin of nearly 1,000,000 square miles. The waters of the Ottawa meet those of the St. Lawrence at St. Ann's, below Vaudreuil. They may be recognized by their difference in colour—those of the St. Lawrence being of a bright beautiful greenish-blue—while those of the Ottawa are of an amber brown. Those two giant streams flow peacefully side by side until partially mixed by the agitation of the current. But even at Montreal, twenty miles from their junction, the two streams, even after having been agitated by the Lachine Rapids, may be easily distinguished. The St. Lawrence, now swelled with the waters of the Ottawa, receives several large and small tributaries in its course to the ocean. The sea, as it receives so august a tributary with its extending train, swells and recedes from its course with an easy-flowing grace, and accompanies its fresh water tributary further than we shall require to follow it.

The waters which have drained our continent meet with the heated waters of the Gulf stream. These have a depth of at least 3000 feet, and, passing between the Bahama Islands, course along the south-eastern shore, and meet the cool waters of Baffin's and Hudson's bays; the waters of the latter carrying with them numerous huge icebergs. The ice is dissolved, and in dissolving drops any organic matter which may be wrapped and entangled in their icy folds; and in cooling the warmer waters of the Gulf stream, separates or precipitates from them the animal and vegetable matters held in suspension and solution to aid in feeding the countless multitude of fishes which here assemble to procure their food. These in turn become the prey of other tribes of fishes—the food for, and the feeders on, the myriads of the finny tribe which have come from the North.

In the "Geology of Canada," published in 1863, we read, p. 6:—"The profusion in which the lakes exist, with, in some instances, only a short interval of land between them, affords . . . a ready means of passing from one navigable stream to another, in whatever part an explorer may be, and thus . . . he can reach almost any position he may wish to attain without any very great deviation from a direct route. Although a large number of the rivers of the Canadian portion of the Laurentides is still unknown, or only partially explored, upwards of a thousand of these lakes are represented on the published maps of the country." Twenty years have elapsed since then, and additions have steadily been made; but one could scarcely believe that a lake so large as that mentioned by Mr. Bignell under the title of Mistassini, a lake which is said to rival Huron in size, and to surpass it in the number and variety of its finny inhabitants, should till 1884 have remained unnoticed since the time when a Jesuit missionary alluded to

it, in a manner so casual, as to have led to a belief that its existence was a myth.

The greater portion of the surface of this country is but little elevated above the sea. According to Humboldt,—

Europe has a mean elevation of	671 feet.
Asia	1,151 "
South America.....	1,132 "
North America.....	748 "
Canada (roughly estimated) may be placed at	300 "

The ascent from the ocean to Lake Superior does not average more than six inches in a mile; and even this ascent is not markedly noticeable till we proceed westward. Montreal, the head of ocean navigation, and which is reached only after passing over several hundred miles of fresh surface water, is at low water but eighteen feet above the level of the sea as it rolls under the lighter fresh water along the bed of its great estuary.

The low altitude of Canada is favourable to its climate and vegetation. Were the plateaus, on the north coast, much elevated, vegetation would be confined to the mosses; and animal life to the few hardy, thick-furred, thinly scattered animals who could remain to nip them. All the long and gentle slopes descend towards the Atlantic and the Frozen Ocean (which is only a dependence); a. all the short and rapid slopes, or counter slopes, are directed towards the Pacific. The land in Canada ascends in a series of plateaus as we approach the interior, and we reach the height of table-land, as it is termed, on the south side of Hudson's Bay.

While admitting, to its fullest extent, the importance of this low altitude at the Labrador coast, it is equally important that the high bold Rocky Mountains and Mexican Cordilleras should exist to protect us from the genial influence of that ocean. Were the ascent from the Pacific by gentle slopes; and were the mountains cutting us off

from the Pacific removed, existence on this part of the continent would be almost impossible. Cold winds from the Arctic and Labrador coasts would be succeeded by warm breezes from the Pacific. Soft clouds, loaded with watery vapours, would enervate us on the one hand; and hail, sleet and snow, with intense cold, would chill us on the other. The changes in temperature would be too sudden—too severe—for man, with all his ingenuity, to endure.

The size and shape of this country operate in controlling the distribution of heat. The greater the land surface the greater the measure of heat; and as the continent of America widens as we ascend in latitude, we find the centre of the system of atmospheric circulation north of the geographical equator. Yet the Arctic and sub-Arctic regions are colder than those of Europe and Asia, and why? Blodgett affords the following explanation:—"The refrigeration at the extreme north of this continent is excessive in winter, and there is no accumulated or accumulating heat at the south to balance it, as the land narrows so rapidly—there is no Africa, Arabia and India to compensate our Siberia, and consequently the continent as a whole is below that of the eastern hemisphere in temperature. The eastern hemisphere has a very large land area at the border of the tropics, while this has very little; and, as the effect of land areas to increase the temperature by accumulation, or to diminish it by radiation, depends wholly on the sun's altitude, the middle latitudes may be softened in winter temperature by land at the north, and such is evidently the case with the north of Europe." This continent diminishes in breadth as we advance towards the south. There is no accumulated heat, therefore, at the south, to temper the cold of the north.

The series of vast lakes and rivers exerts unmeasured influence on the climate of this country. Were it not for

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their presence I should not now be here to speak of them; nor you to listen to me. The sun's rays reach the surfaces of those numerous lakes after having parted with a portion of light on their journey. On reaching the surfaces they are absorbed and converted into heat. They continue to penetrate, with a gradually decreasing energy, till, at a depth which, compared with the lake itself is inconsiderable, the rays of light are no longer seen; and the rays of heat are no longer felt. The depth at which the rays of heat and of light are sensibly felt depends on the clearness of the water. The translucid waters of Lake Superior do not receive one-tenth part of the incident light at a depth of five fathoms. Lakes Huron, Erie and Ontario, being less translucent, receive still less. The influence which these large areas of fresh water exert is, in a measure, proportioned to the depth. If the collections of water are deep, the surface is steadily maintained at a higher or a lower temperature than the surrounding air. In summer the surface waters are heated, and when heated, become specifically lighter, and, in consequence, continue to float upon the surface. During the night, or on cloudy days, the portion of surface water cooled by the withdrawal of the sun's rays, or by the low temperature of the air, becomes denser, and sinks.

The surfaces of the lakes are constantly experiencing changes in temperature, but at considerable depths the temperature in winter and in summer is nearly uniform. The deeper parts of the lakes are always excessively cold, the atmospheric influences being modified in their effects by the laws of statics. "The mean temperature of the climate," says Sir John Leslie, "is not communicated by these variable impressions; every change to warmth being spent on the upper stratum, while every transition to cold penetrates to the bottom, which thus experiences all the rigors of winter without receiving any share of the summer's heat. But, if the beds of these profound bodies

of water remain perpetually cold, their surface undergoes some variety of temperature, and is generally warmer than the average weekly or monthly heat of the air."

Water, it is known, has a great capacity for heat, but a feeble conducting power. It grows warm but slowly in the rays of the sun. The evaporation, being considerable, produces a cooling which tempers still further the heat received at the surface. Finally, the cooler particles of the lower layers of water, set in motion by the waves and the currents, incessantly fill the places of those of the superficial layers of water, and prevent it from rising to a higher temperature.

It is the same with the cooling. The superficial layer growing cool, whether by the absence of the sun, or by contact with a colder atmosphere, the cooled molecules become more heavy, fall lower, and give place to the warmer molecules of the inferior strata. This motion is incessantly repeated, and singularly retards the process of cooling. . . . . Thus the heating and cooling are less sensible and more slow, and do not reach the extremes. The air itself, by its perpetual contact, shares in the uniformity of temperature which belongs to the surface of the water, and which, combined with the abundance of vapours that saturate the atmosphere, gives to the sea (and here to lake) climate its true character. The ocean which surrounds Great Britain and Ireland equalizes their temperature, and renders the summers less hot, and the winters less cold than those of continents under the same parallels: for the great mass of the ocean is but little affected by the changes of the seasons, but preserves a medium temperature during the whole year.

It will therefore be readily understood why the larger lakes in Canada are never frozen. The arms or shallow bays; the rivers leading to and from them; and the shallow margins of the lakes themselves, may be locked in thick-ribbed ice; but the deeper parts will ever remain unfrozen.

It is quite different with the surface of the soil, whose particles are fixed. The soil rapidly absorbs the solar rays. The surface layer is more quickly heated, since it cannot be displaced, as in the water, by another; and it soon attains an elevated temperature. But for the same reason the earth easily loses heat by radiation, whether during the nights or the clear days; and the loss is so much the greater, as the radiation is favoured by the inequality of the surface and the transparency of the atmosphere, which, in Canada, is more usually dry, and less charged with clouds. The lands removed from the influence of the oceans or lakes have thus a climate characterized by the extremes of cold and heat; by more violent changes; and by a drier atmosphere. These are the essential features of the continental climate. If the former is *constant*, the latter is *excessive*.

If we now observe the manner in which water and land are affected with regard to their temperature when near each other, and receiving the same quantity of heat from the sun, we notice that the water is colder than the land during the day, and warmer during the night. In the same way, taking the different seasons of the year: in summer the water is colder than the land; in winter it is warmer. Considerable bodies of water, therefore, preserve the mean temperature, while the land experiences the extremes. "This tends," as Guyon says, "to soften all the differences—to establish uniformity of climate."

Climate.

Canada, minus its lakes, is not unlike the north of Europe in being both continental and oceanic. Its oceanic features, however, are limited, being lost in the continental a short distance from the coast. Even the cold air from Lake Superior, as Mr. Jackson observes, only affects vegetation near its shores; while further

inland the temperature more resembles that of the settled parts of the country. Yet to the lakes and rivers we are indebted for so great a range of animal and vegetable life. But not alone by position, as the reverend writer of "Ocean to Ocean" would permit us to believe. Mr. Grant found vegetation in longitude 110° and latitude 54°, upwards of 700 miles north of Toronto, to be of the same character as that of Ontario.

The extreme heat of summer would give to Canada a continental climate were it not associated with profuse rains at regular intervals; and the cold of winter, like the heat of summer, is severe without being destructive. The extreme cold in winter lays vegetation completely asleep and preserves it; and the thick mantling of snow covers up warmly the roots and spongioles and preserves them, with their investing epidermis, for use in the ensuing spring. The mountains which course the Atlantic and Mississippi valleys affect the temperature but little; and vegetation still less. One feature peculiar to our climate is this: changes occurring in one part sweep with a regular progression to other and more distant parts; intervening parts sometimes modifying—sometimes retarding—but never preventing that progression. "The changes of temperature," says Blodgett, "and the oscillations of every sort strike over this portion of the continent as changes would over any plane surface; they are symmetrical and uniform, and knowing what they are at a few places, we may easily infer what they have been at all."

If we compare the climate of this country with that of Europe, we will find that it closely resembles St. Petersburgh in its winters, and Paris in its summers. If we seek a climate which resembles it in both seasons, we may find its counterpart in the north of China.

As the climate of Canada during the summer months has been compared with that of Turkey, I deem it neces-

sary to state that nowhere in Canada are the winds so variable as in the former country. At Constantinople, for instance, the winds from the Bosphorus are, in winter, sometimes so violent, and so uncertain, that communication with the adjacent villages is cut off. There is but one part of Canada (Saginaw Bay, in Lake Huron,) where such uncertainty exists; and it depends on the quarter whence the wind proceeds, whether cold like that of Russia, or a warmth like that of the south of France, will be felt.

The climate of Canada is much more uniform than that of Europe—I mean that the meteorological differences are such as can be, and are produced by position alone. Yet Europe enjoys a higher mean temperature than any other division of the globe in a similar latitude, and the extremes of heat and cold are not so violent nor so wide apart. These advantages it owes to its numerous oceans, bays, etc., and to its being situated at the western extremity of the greatest range of land on the surface of the globe.

Many of you well know the difference in Europe, not only in temperature, but also in the products of vegetation caused by hills and mountains, lakes and plains; and have recognized differences when their causes were not apparent. Thus the grape vine flourishes in Dürkheim, Hocheim, Deidesheim and other parts of Germany, but does not pass 51°, to which it is parallel in Eastern Europe. It is not met with beyond 47° 30′ on the Atlantic coast of France; 49° in the interior; nor 50° 20′ on the Rhine at Coblentz. At Penzance, in Cornwall, says Whitley, oranges, lemons, myrtles, etc., "require no protection from the frost, and in sunny exposures are grown in the open air. Yet, up to 1747, a small field of wheat was a great curiosity, as very little could be made to grow there." Certain hills in Britain are always enveloped in clouds; others in the vicinity are always clear; while on

others (Greenock, forsooth!) it does not rain always, for "it sometimes *snaws*."

The Dominion of Canada is so vast in extent that one part may be charged with perpetual snows, while the other is bathed with almost perpetual heat and sunshine. One part receives the cold caller atmosphere of the Frozen Sea; another the humid air of the Atlantic; another the mild, genial breezes of the Pacific Ocean. Yet there is no dislocation of temperature from what is proper to each place. In its extremely northern parts, vegetation is so stunted that the highest tree does not reach to a child's knee; in the southern parts vegetation is most luxuriant, and umbrageous plants ward off the rays of the almost vertical sun; and fruit and flowers grow with as much vigor as in Italy or the south of France. Between these great extremes all the cereals, grasses, and flowers of temperate regions are met with; and as we proceed northwards or southwards we meet with an unbroken gradation of vegetation.

But sometimes several degrees of longitude are traversed in Canada without observing those changes in vegetation which as many miles would represent in Great Britain. The Rev. Geo. M. Grant states that when along the North Saskatchewan (two hours and a half behind Montreal time—being then 3° 30′ west of Montreal (Montreal being 73° 33′, or in longitude 111° and latitude 54°, 350 miles north of the boundary line and 700 miles north of Toronto,) "the vegetation was of the same general character as that of Ontario; and Bishop Taché had told us that at Lac la Biche, 100 miles further north, they had their favourite wheat grown; where the wheat crop could always be depended on." At Fort Liard, on the Liard River, a tributary of the Mackenzie, in latitude 60°, Mr. King says he had never seen better wheat or root crops than are raised there. "Wheat is raised with profit," says Sir John Richardson, "at Fort

Liard, latitude 60° 5′ N., longitude 122° 21′ W., and four or five hundred feet above the sea."

The Rev. Geo. M. Grant, from whom I quote, gives this explanation why the isothermal lines should extend so far north in this longitude, and why there should be the same flora as farther south, though the summers are so short:—

"The low altitude of the Rocky Mountains, as they run north, permits the warm moisture-laden air of the Pacific to get across; meeting then the colder currents from the north, refreshing showers are emptied on the plains. These northern plains of ours have also a comparatively low elevation, while farther north in the United States, or the same longitude, the semi-desert, rainless plateaux are from five to eight thousand feet high. Combined with these reasons another may be suggested—that the summer days being much longer as you go north, plants get more of the sun, that is, more light and warmth within the same period of growing weather. The summer days where we are now, for instance, must be two hours longer than at Toronto."

The oscillations in temperature in Canada are more frequent, and greater in summer than in winter. In winter the temperature is sometimes reduced almost to that of Labrador. But in all parts of Canada the curve is more or less regular.

It is not unusual in summer to observe a variation of temperature of 30° F. in less than as many hours. Extreme variations are recorded where twice that number of degrees were passed over in thirty-six hours. Early in the month of May the occasional rapid rise in temperature often induces the youthful and uninitiated to lay aside a portion of their clothing—an imprudence which is often followed by regret. In winter the oscillations in temperature, though not so frequent, are occasionally greater than in summer. Capt. Bayfield mentions an instance—

a rare one, certainly—where he observed the thermometer at Penetanguishene, on Lake Huron, at 30° F. during the day, with heavy rain, to fall to —33° F. next morning. It would be a libel, however, to state that changes remotely approaching to this are frequent.

The climate of Canada may be considered a dry climate, yet more rain falls here than in Great Britain. But it falls in a short period, and in larger quantities at a time. While only thirty inches of rain fall during the year in England, nearly fifty inches fall here. At certain times, and particularly at the commencement of bad weather, the air is sometimes so dry that dew cannot be obtained by the evaporation of ether. I say at certain times—but I may also add at all seasons, though not frequently in early spring and late autumn. In winter the air within doors is frequently at, if not above, summer temperature; and that without at zero. The dew point, under these conditions, is easily reached.

It is stated by Babinet that air at 86° F. contains six times as much vapour as air at zero. As a consequence, the air of this country, during the cold season, contains less vapour than the air of warmer regions, or at warmer seasons.

When Judge McCord made observations, many years ago, at St. Helen's Island, opposite the city of Montreal, he found the lowest temperature was reached at 6 a.m. in January, February and March; and 4 a.m. for the other months except June, when 2 a.m. was lower than 4 a.m. The even hours alone were observed.

Persons who are themselves ill, or who wait upon those who are, have observed, or fancied, that the temperature of the air is colder towards morning, and have attributed this reduced temperature to fatigue or want of rest, or want of food. But the temperature is in reality lower at or before daybreak, as already stated.

Judging from the growth of the maize or Indian

corn—a cereal which requires a mean temperature of not less than 65° F. for its growth and ripening, the summers of the central and western portions of Canada closely resemble the summers of the west of France. But the Canadian sky rivals that of France in clearness—a clearness which is obstructed only for a short period every few days; or, it may be, at certain intervals, by a succession of showers which are developed by the heat, and move with the west wind. To this bright, clear, though sometimes, for a time, uncomfortably warm summer, succeeds an autumn which, like spring, is of short duration. The transtition from warm to cold weather is sudden and abrupt. But when frost is about to set in, the cool chilling winds of November give place, for a few days, to soft balmy breezes; a thin beautiful haze covers the face of Nature; and we revel for a time in that most delightful of all seasons—Indian summer—"The year's last loveliest smile." This beautiful but short-lived period, which has no counterpart in Europe, derives its name from the circumstancce that the Indian hunter takes advantage of it to track the bear and deer and other game to their winter haunts, where they are fat and in good order. The opinion that the haziness of this season is one produced by the firing of distant prairies by the Indians, is absurd. The haziness is more probably due to the conversion of the abundant waters into ice, when the caloric which preserved them in a state of fluidity is given out. The heat is accompanied with mist, as we may see it at any time rising from the surface of a partially frozen stream. This is a season of uncertain duration—certain, however, not to last a week. The Lower Canadian *habitant*, as we may gather from the following, assigns to it a much shorter period:—

"L'Été St. Martin
De soir au matin."

In those parts of Canada where the Indian summer has a longer duration, the sun goes down with a beautiful

crimson flush, and the temperature is peculiarly grateful. The wild fowl, taking advantage of this season to migrate southwards, are seen on the lakes and rivers in countless flocks, and sportsmen, at long range, diminish their numbers.

In Western Canada there is a period of mild hazy weather following the first snow, and lasting about a fortnight, to which the term is applied.

If we are ignorant of the probable duration of this uncertain season,—uncertain in its occurrence—uncertain in its duration,—we are not allowed long to remain ignorant of its termination ; for the sharp, piercing winds ; the crackling frost which crisps the surface of the ground and bridges over the ponds and smaller rivers ; and the thickly falling mantle of snow, like ermine, unmistakeably announce Canadian winter ; and the merry tinkling bells herald the announcement with joy. Berleaus, carioles, sleighs and traineaux replace the now useless wheeled vehicles, and pass smoothly over one uniform plain, one level superficies of snow—level as the surface of a still lake. And on the bosom of the still lake itself, and of the running stream, the skater glides with the velocity of the wind, for—

> " Mighty Peboan, the winter,
> Breathing on the lakes and rivers,
> Into stone has changed their waters."

Having cursorily alluded to the points of difference and of resemblance between the climate of Canada and that of the west of Europe, I shall say a few words on the peculiar features of

The Seasons.

It has long been the custom to divide the year into seasons of three months each. This is an arbitrary division at best, anywhere ; and is totally inapplicable to Canada. Throughout the greater part of this country the

Indian measures his life by the summers; but in the extreme northern parts winter is the great predominant portion of the year; and by it the years are numbered: First, winter;—when the temperature moderates, it is the season of "water drops;" later still (May) that of thaws; later still (August) that of "no ice;" later still the fall, the aborogines' fifth season. This division is in reality less arbitrary than that which we are accustomed to make. Our spring, like the gloaming, is of short duration. Yet, obedient to custom, I shall rob winter of its March and summer of its May and add them to April, that we, like others, may have a spring—that season when

> "* * * the juicy groves,
> Put forth their buds, unfolding by degrees,
> Till the whole leafy forest stands display'd
> In full luxuriance. * * * * "

This is a season of great variability—one portion differing from another, and from the same season in different years. April divides the extremes equally, and is the only month which may with truth be called a spring month. Dr. Drake says the true spring and fall seasons are "the sixty days immediately succeeding the equinoxes;" that the "heat of this season is absorbed in the process of converting ice and snow into the liquid state, and can thus only imperfectly enter the atmosphere." When this change is accomplished summer is with us; and no sooner is the ground cleared of snow and partially dried than vegetation springs forth with wonderful rapidity. Dr. Kelly states that "the two seasons (winter and summer) almost fill up the year, for there is little can be called spring, and not much autumn." And Judge McCord, writing on the same subject, called spring "that very short period, the *avant courier* of summer." As might be supposed, when there is no lingering spring, leaf and blossom are not unfolded one by one; but, as if by magic, so soon as the snow disappears, a shower of warm rain starts

every sleeping thing into life. The rivers are swollen, and move with unwonted power; the air is pure and refreshing; and cirrhus clouds chase each other through the heavens, or pour forth their welcome burden on the earth beneath. On the first of May the trees may yet be leafless, and on the fifth no verdure may be seen to vary the monotony of the still brown earth—and on the fifteenth every tree is clothed in green; every bush with leaflets; and the cattle are grazing and browsing in mute thankfulness to the great Giver of heat and light. Ere long

> "Ripe fruits and blossoms on the same tree live;
> At once they promise, what at once they give."

According to Blodgett's isothermal chart for this season, a line of forty degrees, mean temperature, passes through Nova Scotia near Halifax, Montreal, then parallel with the St. Lawrence, north of Kingston and Toronto, south of Penetanguishene to the Red River of the North. This may be regarded as the temperature of April, being too high for March and too low for May. The mean of the spring and summer months is nearly 10° F. warmer at Red River than at Toronto!

The advance in temperature is pretty uniform for those three months, and towards the Atlantic coast the march in temperature is more rapid than at midland stations. "In the greater part of North America," Blodgett says, "there is a regular course of differences in the successive months of the year, as follows:—January is coldest; February, 2° to 4° warmer; March, 8° to 10° warmer than February; April, 10° warmer than March, and nearly at the mean for the spring and also for the year; May, 9° to 12° warmer than April; June, 7° to 9° warmer than May; July, 4° to 6° warmer than June; August, 1° to 3° less than July; September, 5° to 8° less than August; October, 8° to 10° less than September, and near the mean for autumn and the year; November, 10° to 14° less than

October; and December 10° to 15° less than November." This curve is not so sharp about the Atlantic and the great lakes.

The advance in temperature—not to tire you with figures—may be best illustrated by the influence exerted on some of the members of the animal and vegetable kingdoms. Even before the snow is off the ground the sap begins to ascend in the trees to form their leaflets, and is the season of which the woodsman takes advantage to insert the gouge and the spoil to draw from the majestic hard maple its ascending sap, to reduce it and crystallize it into sugar.*

In March, the robin (*Turdus migratorius*), while snow yet covers the fields, is seen to mount his post near some dwelling and make frequent attempts at the song. But his voice is still husky, and that most probably furnished a theme for the "Down-East" poet when he wrote:—

> The first bird of spring he mounted a limb,
> But ere he had sounded a note
> He fell from the limb. Ah! a dead bird was him,
> For the music had friz in his throat!

The song-sparrow sings *in* the month of March. The partridge (order *Gallinæ*, of the genus *Tetrao*,) now chooses his or her mate (for we do not know to which sex belongs the privilege of choice); the woodcock (*Scolopax minor*) arrives towards the latter part of the month; and at the same time the moose deer (the representative of the elk in Europe) leaves his winter haunts to search in the marshes for his food; the wood-duck (*Anas sponsa*), according to Mr. Lett, makes its appearance about the fifth of that month, when "winter is restless in the lap of spring," to remain with us about seven months. On the twenty-third of the same month (April) the wild goose visits the

*Three or four gallons flow in one day from full-sized trees, and make about one pound of sugar.

North ;* and on the same day the frog first utters his harsh guttural sounds in this neighbourhood.† In the latter end of April the woodpecker, of the family *Picidæ*, finds his way back to us from the South, where he has been amusing himself since October. Early in May the bobolink, or rice-bird (*Dolichonyx oryzivorus*), arrives, and is soon engaged in preparations for her young, and the rosignol, or song-sparrow (*Fringilla melodia*), proclaims his gladness at the return of warmth.

It has been observed that the earliest birds and mammals are those met with in the warmer parts of the country ; but the same birds and animals arrive at maturity earlier in the more northern parts. In the warmer districts the young bird has all its feathers, and is almost enabled to dispense with the fostering attention of its parent ere the northern bird has pecked through the shell which covers its nakedness ; but the northern bird is plump and full-grown ere that of the warmer temperature has ceased to be a fledgling.

> "And now the butterfly, on pinions bright,
> Is launch'd in full splendour on the day."

About the first week in May snow has quite disappeared from the neighbourhood of Quebec. At Montreal

*The regular advent of the wild goose is remarkable. I have heard Dr. Rae state that during the seven years he was in search of Sir John Franklin he was never without wild goose for dinner on St. George's Day (23rd April). On the 22nd he would announce to his men they would have wild goose on the following day, and they would reply there were none to be seen anywhere. But on the morning of the 23rd the Doctor, confiding in that mysterious agency which controls the movements of the feathered tribe, would take his gun, and as the sun appeared above the horizon wild geese would be seen directing their course still northwards. A few would be stopped in their flight to furnish a more savoury dish to the consumers of pemican and robiboo.

†The frog has been known to make his appearance on this island, many years in succession, on the same day. The late Dr. Smallwood said that only once in fifteen years had he heard the first croak on another day.

—180 miles westward—nearly three weeks earlier; and so on, westward. At Toronto much of the spring ploughing is completed before that period.

The rapidity with which spring succeeds to summer in the extreme northern parts is truly surprising. At Dease River, for instance, on the first day of June, ice measuring five feet in thickness sealed up the river, and many feet of snow covered the landscape. "On the third," says Simpson, "what a change! sudden, delightful, and complete. The frosts almost entirely ceased; the temperature at midday attained from 40° to 70° in the shade; the snow disappeared, as though by magic, from the surface of the ice and of the ground, forming many brooks and rills of water; the willows timidly put forth their buds; and the woods grew vocal with the voice of song."

The rain chart for this season gives a distribution of five inches for all parts north of lakes Superior (upper end), Mackinaw, Quebec and Newfoundland; and six inches for all parts north and east of that line.

This brings us to that season of extreme heat—refulgent summer—which presents such striking contrasts to the season we have just considered, and to the same season in corresponding latitudes of the eastern continent. The mean temperature of the regions watered by the Moose and Abitzibee corresponds with the north of Europe and St. Johns, Newfoundland; being 65° F. The regions drained by the north part of the Ottawa, by the Saguenay; and the northern parts of Nova Scotia, correspond with the south coast of England, Paris, middle of Germany and south of Russia, being 60° F.; while 65° represent the summer temperature of the regions bordering upon the upper lakes, Hamilton, Toronto, Kingston and Montreal, and the St. Lawrence to Quebec.

It is difficult to account for this exaltered temperature. Richardson, in his Arctic expedition, says the course of the ocean currents and the interposition of the penin-

sula of Alaska, and its prolongation in the Aleutian chain of Islands protect the west coast of America from the masses of drift ice which, in the same latitudes, encumber and chill the Labrador coast for most of the year. The meteorological register, for a series of years shows, that the temperature in each of the months of summer is found to have descended nearly to freezing point, and that there is no month in which frosts do not occasionally occur.

The heat of summer does not continue uninterruptedly for many days. During July and August, west and south-west winds accompany the heat, and bring with them frequent thunder showers, which cool the air. Easterly winds are always accompanied with cool weather, so that, from whatever part the wind blows, we may look with confidence for cool weather, with or without rain. Sometimes the rain is ushered in with high winds; but more frequently, towards the close of several days of high temperature, the sky becomes overcast; flashes of lightning illumine the darkness; the thunder roars, and down comes the rain—more in streams than in drops.

In the period which precedes a thunderstorm, when every animated being is strangely burdened and oppressed, the electricity in the atmosphere accumulates in the clouds; occasionally lightning flashes from cloud to cloud; that which has most gives to that which has least; and, in this way, a whole summer evening may pass in brilliant, yet silent illuminations. More frequently, however, the lightning flashes to earth; thunder detonates; rain falls in torrents; the electrical equilibrium is restored, and all again is calm.

Thunder storms occur most frequently in the afternoon —rarely in the morning. The diminished temperature of morning; the dews; the vapours which afterwards arise, afford a more or less perfect means of communication between the atmosphere and the earth; but, as day advances, the clouds become lighter and ascend, and elec-

trical communication does not take place insensibly between the earth and the surrounding air. The thunder-storm, which may have begun in the west, travels eastward, darkening as it goes, and is followed by even brighter sunshine. The husbandman, busied in the field, allows the un-yoked cattle a few minutes repose—and often-times but a few moments—for the sky is soon again unclouded; the whole face of Nature is changed; and the rumbling noise of the retreating thunder tells us that other districts are receiving the welcome and refreshing rain.

The summer in Canada has, by some travellers, been compared with that of Arabia. But there the atmosphere is in a state of constant repose, except when the dry, hot, withering simoom sweeps over its surface. Rarely, indeed, is the atmosphere, with us, in a state of quiescence; and the friction of its particles alone, independent of the heat, is an agreable excitant.

The low altitude of Canada and of the St. Lawrence valley contributes greatly, no doubt, to the exaltation of temperature, not only at this summer season but also of winter, and favours those occasional low temperatures which have been noticed.

The mean distribution of rain for this season is ten inches for the whole of Canada (except the lake districts), to the "Lake of the Woods" in the fiftieth degree of latitude, where it suddenly sinks to six inches. The rain falls in large quantities, and usually at such regular intervals, that we are not taken by surprise at its occurrence.

During this season fire-flies are first seen in the middle of June. Wheat is sown at about the same time. About a month later the night-hawk (Chordeiles Virginianus) hatches her young. About the commencement of this month (June) the capelan, having, on their lengthened journey from the north, furnished food to larger fish, move up the St. Lawrence in columns so dense as to offer resist-

ance to the oars and boats of the boatmen, and are quickly followed, for a short distance, by the codfish. The salmon, in the early part of June, appears in the estuaries; and about th end of July, according to Forrelle, begin to ascend the rivers, seeking the spot where they were born, and where they spent the first year of their life. In August the female beaver, after having, in a separate lodge, given birth to her young and brought them up till they are able to follow her, returns with them to her partner and her family.

AUTUMN.

We now approach the autumnal season, when Nature clothes herself in the richest robes, and the temperature lowers to a more comfortable degree. The first month of the season (September) is one of exceeding beauty. It is a glorious season, for while the sun's heat is less sensibly felt, his rays are not less bright.

The changes from the heat of summer to the temperature of autumn are sudden, and but a short time elapses between the sering of the leaf—green but yesterday—and the rustle of its dry, lifeless form. Rains are now more abundant and more frequent than during summer. Frosts are now very frequent at night, even in the first month of this season (September); and a month later they are frequent during the day. November is more a winter month, though custom has assigned it a place with autumn.

The mean temperature of the St. Lawrence valley and of the lake districts for the three months of autumn is 45° F., and 32° F. is the mean temperature of November in the same region. While north of the forty-seventh degree of north latitude, from Newfoundland through the Saguenay and the Upper Ottawa districts, the mean temperature of the three months may be represented by thirty-two degrees. This season corresponds closely, in its climatological features, with the interior of Europe.

Of course autumns vary, even with us. Sometimes they are long and beautiful; but they are longer as we travel westward, where the snow is later in casting its white mantle over the brown earth. But this period of snow is often preceded by hoar frost which lights up and reflects, without concealing "every leaf and copse and meadow."

In the second month of autumn the woods and forests change their garb, assuming the richest and most variegated hues. This season proclaims its lengthened days by its changed foliage: the ash becomes deep crimsoned; the soft maple leaf assumes a beautifully variegated pink; the hard maple a yellow. These changes are as sudden as the flowering and the leafing in spring. Some leaves, as those of the soft maple, become tinged with the richest crimson; some with orange; while the evergreen, cedar, pine and hemlock give to the forest, at this season, a richly variegated appearance, which is not paralleled elsewhere. Summer, in her departure, gathering around her all her splendour expires like "a blood-stained martyr, full of joyful hope of a resurrection to come."

Many of the Indian ceremonies in ante-Christian times (and even in Christian times, where the missionary has had the good sense not to discard them, but to engraft upon them a living faith,) took place in Canada at this season, and borrowed some of their interest, and much of their wildness, from the surrounding scene.

And now from threatened "winter's cold the birds take wing." Early in October the robin* (the most common species of the family of thrushes, and named from its fancied resemblance to the robin red-breast of Great Britain), hitherto met with, singly or in pairs, may be seen flocking together preparatory to starting for the south. At about the same time the song-sparrow or rossignol, of the order Passeres and family Fringillidæ, migrates during the

* See New Dominion Monthly, Vol. I., No. 2.

night, singly or in groups, to the warm regions of the Southern States. On the 25th of October wild geese, and the larger kinds of duck pass us from the north. At about the end of the first week in November, crows leave here for the warm regions southward; and about a fortnight later the snow-bird comes hopping around our dwellings. In the early part of October the black bear of the genus Ursus (styled by the Indian the "old man in the fur cloak," because it has the strength of ten men and the sense of twelve,) sleek, fat and glossy, retires to his den (either a cleft in the rocks, or a hollow tree), to dream of returning warmth in spring; and where, it is said, like the marmot and other hybernating animals, its temperature is lowered and its respiration and pulse become slower. The Canada jay or moose-bird (Garralus Canadensis) now follows, but never precedes the first frosts.

Nature here, as elsewhere, makes provision for giving to animals, for their preservation, a covering of the same colour as the objects around them; and for changing the fur or plumage as the seasons change, whitening them when the ground is covered with its garb of white. And already the timid northern hare (Lepus Americanus) begins to change color—from its summer brown to a winter white. The cheeks are first whitened, giving to "pussy" an ancient appearance; then the shoulders are streaked with white, which extends to the hind quarters, and completes the metamorphosis in little more than a week.

Occasional falls of snow now permit the use of sleighs and traineaux. But even yet the smaller rivers are quite free of ice. In Eastern Canada, the light snow which first falls, usually in the last week of November, is called *la poudrerie de Ste. Catherine*, and the *habitant* will tell us, with seriousness, that some parts of Canada are never without its visitation in that form at that time.

Ere we have caught the last sad, lingering look of autumn,

> . . . . The year growing ancient
> Nor yet on summer's death, nor on the birth
> Of trembling winter,

we are made sensible of the renovating force of another, but not less pleasant season, when

> "Winter holds his unrejoicing court,
> And through the airy halls the loud misrule
> Of driving tempest is forever heard;
> Here the grim tyrant meditates his wrath,
> Here arms his winds with all-subduing frost,
> Moulds his fierce hail, and treasures up his snows."

Had Thompson written his "Seasons" in Canada, his conception of winter would have been vastly different. In the minds of Europeans, generally, winter is associated with dreariness; but, to the Canadian, with cheerful enjoyment, when festivities are looked forward to with pleasurable anticipation. The delight at witnessing the falling snow, and at seeing it cover up the inequalities of the earth's surface, permitting sleighs and carioles to glide over it, is never equalled by that on witnessing its disappearance in spring. For health the most vigorous waits upon a physical enjoyment which has succeeded to the severe labour of ploughing, harrowing, reaping, harvesting, etc.

The winter temperature of this portion of the continent is, according to Sir John Richardson, eight to fifteen degrees lower than that of the same latitude in Europe; and lower than any one, ignorant of the physical geography of the continent, would expect. It is in this dry, clear, bracing season the thermometer is an imperfect guide to the sensible condition of the atmosphere.

Persons accustomed to the raw, damp winter atmosphere of Great Britain might well be alarmed at the prospect of being obliged to subsist, during three months of

this season, in a temperature so much lower than that which had already sufficiently chilled them in the country whence they came. But the degree of cold is rarely uncomfortable. There is no day too cold for out-door occupation, and with the thermometer much below zero, the backwoodsman, as I have often seen him, with uncovered arms and bared chest, glowing with heat and health, makes the forest ring with the stroke of his axe. There is no day too cold for him. The nature of his food, no doubt, is such as to furnish him with a large amount of the necessary animal heat; but the immigrant of the previous summer, whose habits in that respect are not yet quite changed, seems to bear the low temperature with equal comfort.

Charlevoix, writing about the ancient and interesting city of Quebec, says :—" On respire en ce lien, l'air le plus pur . . . . d'ailleurs le climat y est fort rude; car plus on descend le Fleuve, et plus on avance au Nord, plus, par conséquent, le froid est piquant."

As an evidence of the ease with which cold may be borne, I may state that in the colder, more northern regions Dr. Rae's party was often reduced to the necessity of sleeping under a single blanket when the thermometer was 77° below freezing point. This may appear cold comfort, but was added to by the practice of the men taking a kettle or two of snow to bed with them to be liquified. Yet the men, sandwiched in this way, were soon asleep, when the fatigues of the day's journey were over.

Metals, during severely cold weather, when tightly grasped, blister and burn with as much facility as hot metals, as the heat passes from the hand into the cold metals so rapidly as to destroy the integrity of the part it left. The chemist could understand this. Those ignorant of it are sometimes taught the lesson feelingly. Some years ago, when driving on a very cold day in the country, the linch-pin required removal. My driver (a recent

importation) attempted to unfasten the strap, but his hands were too numb, and he attempted to use his teeth. But his lips came into contact with the metal, and were pinned there; the tongue was protruded to aid in detaching the lips, and it, too, was caught by the tip. It was only when I had isolated the iron and had warmed it for some moments with my gloved hands, that it relinquished its hold. The mucous covering of lips and tongue remained, however, attached.

It is at this season the genial influence of the Pacific would be most sensibly felt; but, the high, bold Rocky Mountains shut us out from that influence; while the winds from the northwest, north and north-east sweep chillingly over us. It is the opinion of some meteorologists that the causes of the extreme cold in winter are simply continental—the vertical configuration coming in as accessory to some extent, everywhere, and decidedly so at the Pacific coasts.

An isothermal line of twenty degrees, mean temperature, passes from the south of Newfoundland to Pictou in Nova Scotia, Kingston, Penetanguishene and the lakes. A mean line of fifteen passes through Fredericton, Montreal, the Ottawa region north of Ontario and Huron; while a line of ten degrees passes through the centre of Newfoundland, Quebec and the north of Lake Superior; Ottawa, the Canadian capital, has about the same.

The winters in the southern parts of the Western Province of Canada are nearly two months shorter than in Eastern Canada. That may account for Lord Sydenham's preference for Western Canada, which is very plainly expressed in his memoirs (1843):—"I am delighted," he says, "to have seen this part of the country; I mean the great district, nearly as large as Ireland, placed between the lakes (Erie, Ontario and Huron). You can conceive nothing finer—a climate certainly the best in North America."

As we proceed seaward, the climate of Nova Scotia, in point of temperature, corresponds with that of Eastern Canada. But, from its maritime situation, the frost of winter, though equally strong, has not the same fixed duration; while the thaws break up communication. Mr. Haliburton does not reckon on more than six or eight weeks of sleighing in the season.

The influence of the waters of the lakes in exalting the temperature of winter is most marked. The thermometer indicates the difference, but our bodies do not, for the air is more moist in consequence, and that moisture compensates, in a suitable manner, for the difference in temperature.

I cannot refrain from drawing attention to the isothermals as they pass into the Hudson Bay possessions. What become of them? When they reach the upper end of Lake Superior they turn due northwest, and the line of 15° (the temperature of Montreal) passes through the Red River settlement; while the great plains of the Saskatchewan are as warm as Kingston or Pictou—actually five degrees warmer than Montreal.

There is generally an interruption to the cold on the third day; for the cold of winter has been said to have its *certain intervals*. The severe cold always remits at or before the end of the third day, and it very rarely occurs that severe cold continues till the fourth day. But to this general rule there are exceptions. In 1795 the thermometer registered here 23° below zero, and this hyperborean temperature lasted forty-two days, during which there was no interruption to the frost. This low temperature was general all over Europe.* In the first month of the year there usually

*During that time Pichegru sent into the sea of Holland detachments of cavalry and light infantry with orders to cross the Texel, and to take possession of the ships of war which the ice had surprised when at anchor. The order was executed and "the novel scene was witnessed of the cavalry of France taking possession of the naval army of the Dutch."

occurs the January thaw. This winter thaw, which generally follows autumn's cold, lasts eight or ten days. The thermometer often rises 50° or 60° in a single day. The whole country is inundated with melted snow—rains sometimes accompany the warm south winds, which soften still more the air—sleighing becomes bad, and locomotion of every kind difficult. There is so strong a disposition in the animal frame to inertia that returning cold is welcomed with joy, which, when it comes, pins the glistening particles of water on every branch; and the rays of light from a bright unclouded sun are reflected and refracted with exquisite brilliancy. By moonlight the effect is heightened, mellowed and softened, especially if cold is severe, for there is a seeming connection between the increasing cold and the increasing moonlight.

Sometimes, when the sky is clear and cloudless, and the thermometer is low, a deposition takes place of small crystalline bodies which resemble hoar frost in their crystalline character, but which result from radiation rather than precipitation.

HAIL.

The hail storms which sometimes occur at this season, but more frequently at a warmer period of the year, result from opposing currents at unequal temperatures and unequally charged with moisture. The hail itself, although white, is a clear, transparent crystalline body. Dr. Kelly says they are quite free from the concentric layers that are observed in the round hail of more temperate seasons or regions. They seem to be drops of water, formed in an upper warm stratum of air, which are frozen during their passage through a colder stratum near the surface. But, should the stratum near the surface not be cold enough to freeze the watery particles in their rapid descent, then every tree and shrub is soon enveloped in an icy coat,

which, by its weight, is often sufficient to break off even the larger branches.

SNOW.

Early in this season, violent cold winds drive the snow along with wonderful impetuosity. The snow is piled up in heaps on the lee side of hills and fences, when winds from another quarter disturb its quietness later.

The superficial layers of the snow are usually at the temperature of the air, however low. It is only at considerable depths the temperature of the snow is more elevated and more uniform than the air above.

But the snow does not present the same appearance in all parts of Canada; nor in the same place, at all temperatures. Sometimes the snow consists of minute, intensely frozen particles which seek out and find every crevice in one's covering.

When at a low temperature along the northern coast (–25° to –45°) the snow often presents resistance to the onward progress of the sledge. Excessive cold produces an increase of friction, and renders the passage over the snow of sleigh runner or tobogan less easy.

In general terms it may be stated that along the lake districts, where the water does not freeze, the snow in the neighborhood packs more closely, and is not easily lifted from the ground. It occupies a less bulk therefore than elsewhere. This is particularly noticeable in the Upper Ottawa and on this side of the Rocky Mountains, where Capt. Palliser, at the head of a surveying party sent out by the British Government, discovered a pass through them.

Elsewhere in the interior the snow is drier, and being drier is more expansive. When snow, in the interior, falls among trees, in a woody district, it is very different from what it is in open and exposed districts. The latter is commonly rough and granulated, lacerating the feet of

man and beast, and not forming the soft, elastic, velvety cushion which the snow-shoer so much loves; and which the partridge plunges deeply into to find warmth and safety from the predatory fox—yet which is firm enough to support the light-treading hare.

When the traveller is reduced to the necessity of melting snow for water, the hard and granulated article yields the larger amount of superior water.

In places far removed from the humid influence of the Atlantic or Gulf coasts, in the east; or of the lake districts in the west, and where the first snow of winter remains till the last snow disappears in spring, each successive fall of snow increases the thickness of the earth's white mantle, and a section of a bank of snow, late in the season, will show a layer of light cellular snow; another more condensed; another, perhaps, of almost impalpable powder; another of impacted snow dust; and perhaps another humid deposit, frozen or not, according to the temperature of the air at the time of falling.

The largest quantity of snow falls usually in December and February.

The mean distribution of snow is sixty inches, but it is rarely that depth at any time, for the snow very quickly *packs*, as it is termed, and the January and other thaws diminish it still more, converting a portion of it into water which, in the latter form, occupies but a twelfth of its former bulk. The melted surface snow freezes and forms a crust capable of supporting men, dogs and wolves, but not the timid deer,* who now falls an easy prey.

In many parts of western Canada the snow is melted

*The deer is obliged either to lift its foot perpendicularly out of the hole it has made in the hard snow, or maim itself by coming into contact with the crust of frozen surface snow. Many a poor animal, when captured after a short and unequal race, has its skin, flesh and tendons torn across; and in some instances even the bones of the legs are broken.

soon after its precipitation, so that the ground, at times during the winter, is covered to the depth of many feet; and at others is entirely bare.

The thick mantle of snow has its economic uses. Without it, the continued action of cold during five or six months of the year would so rob the earth of its caloric, that the heat of a single summer would be insufficient to restore the warmth necessary for vegetation. But the earth being kept warm by this thick non-conducter of heat, no sooner does the snow disappear than the germination of plants begins. In this way the lives of myriads of insects are preserved from one season to another. In this way, also, the temperature of the waters of our lakes and rivers is maintained at 32° F., whatever may be the external cold; and the finny tribes—by a kind and beneficent Being—are protected. That coating of snow or of ice—or perhaps of both—which looks so cold and comfortless, is in reality the warmest, the best protection against the cold; and when returning warmth has broken up this thick covering, the temperature of the water is found to be the same as when it was crusted over in December, and the myriads of fish are alive and in good health, without having experienced the greater cold, or those occasional interruptions to it, during the winter, which air-breathing animals have felt, sometimes, to their discomfort.

The protecting value of snow is not always the same. At first the soft white coverlet falls gently around the various forms of vegetable life. As the season advances, the snow is subjected to disturbance and compression by the winds, rain and frosts. In more northern districts, vegetable life may have its warm, soft, porous, reticulated covering of snow; above that an icy covering; and these may alternate in layers, according to the frequency of the thaws or rains, and form diminutive ice watersheds, protecting struggling vegetable life against untimely frosts and undue washings.

It may not be generally known that snow has, in Canada served to form breastworks for the protection of the soldier. When Arnold invaded Canada in conjunction with Montgomery, he took advantage of the cold. He constructed ramparts of snow, with snow shaped in the form of walls. On these he poured water, which the intense cold soon converted into ice. The men were as safe behind them as behind sand-banks.

Snow crystals present as distinct a mathematical form of crystallization as that which characterizes the more lasting diamond or other crystal. They are well-defined hexagonal or six-sided prisms, and vary from one-tenth to two-tenths of an inch. Mr. Glaisher, in England, and Dr. Smallwood, here, have observed that when electricity is of a vitreous or positive character, the snow crystals present a stellar form; while negative or resinous electricity accompanies crystals of other forms.

All through the interior—when the snow crystals have had time to form, and have formed slowly—the most definite crystalline forms are noticeable, dependent, as already stated, upon the electrical condition of the atmosphere.

When the winter weather is mild, no sound is heard when the snow crystals are crushed. But when objects move over the hard snow a creaking sound is audible, as it were of complaining at the weight which crushed and crumpled its fair surface. It is only when the frost is severe, and the snow crystals hard and crisp, that the sound is heard. The sound of a heavy-weighted sleigh is often heard at a considerable distance. The *habitant* tells us that sometimes he has heard the sharp crisp creaking of the *undisturbed* snow. It is like the "fine crepitus" of medical language. It is heard only in hilly districts, and is attributed to the unequal contraction and dilatation which go on on uneven surfaces. The horizontal snow-field is silent.

In the clear winter atmosphere, when everything is clothed in white, distances are not correctly appreciated, and even ærial perspective is at fault. Without points of comparison with which one is familiar, conjecturing distances would be erroneous.

FROZEN RIVERS.

All the small rivers are frozen over early in December. The Ottawa is sealed up early in January, and the St. Lawrence about ten days later. On the smaller lakes, the Indian, compelled by hunger to seek for food, when he discerns a fish lying at the bottom, strikes with a heavy piece of wood directly over the unsuspecting one. The impulse transmitted through the vertical column of water stuns or perhaps kills it, when, in either case, it floats to the surface, and is removed through a hole cut in the ice for the purpose.

All the rivers in eastern, and nearly all the rivers in western Canada are frozen over every winter; while in the most northernly parts the smaller tributary streams are frozen to the bottom. The fish they contain anticipate this, and secure themselves in safety in the deeper waters of the lakes or larger rivers.

Although ice is usually of a lesser specific gravity than the water which sustains it, it sometimes happens that ice is found adhering to the bottoms of rivers, or sinking below the surface of lakes, whose surface has been agitated by the wind. But this is the case only with ice which is saturated with water, and which becomes water soaked, as even the most buoyant timber sometimes becomes; and not with strong sound ice, broken up by the current beneath it.

The sinking of ice, as it is termed, is variously explained. It is not unusual, when finding ice adhering to rocks at the bottom of rivers, to ask: was it formed there, or did it form at the surface and sink? It may be safely asserted

with Kane that "ice never sinks in a liquid of the same density as that in which it formed."

It would appear as if the ice often acted as acts a membranous diaphragm when interposed between fluids of different densities, as if endosmotic and exosmotic action were going on, regulated by the difference in density, or, in other words, the difference in temperature between the fluid above and that below the ice. This action is more noticeable when, during the winter, one or two thaws have occurred, which leaves melted snow or melted ice above this thick diaphragm. Subsequent congelation takes place, but a slight elevation in temperature again liquifies the super-stratum, and the process of infiltration goes on. Ice, thus re-united, is the soonest to show signs of decay.

It often happens that, for some time before the general break up of the ice, it becomes softer, more slushy, infiltrated and sodden. Its crystalline, quartz-like structure undergoes changes which modify its cohesive force. No longer a clear crystalline structure which lies upon the water; but the water below, and the slush above, by an action not unlike capillary attraction or infiltration, have permeated and disturbed its clearness. As its clearness is diminished so likewise is its hardness. Sometimes this process of infiltration—this endosmotic or exosmotic action—begins from below, sometimes from above; but evidence of this action, whether from above or below, is unmistakable.

Sometimes it happens that deep down in our streams, rivers and lakes—either forced down by pressure, or forming there—are deeper strata of water-logged ice with a density nearer that of the water. As the temperature of the latter diminishes, those masses come to the surface, but not above it.

But ice, however thick, however strong, however crystalline, undergoes, even in the coldest weather, those

changes which James D. Forbes recognized in the glaciers of Europe. He gave not to those crystal masses the physical qualities of impenetrable solids, but imputed to them the viscous quality of semi-solids.

The elasticity of ice is well known to any one who ventures across it when it is scarcely strong enough to sustain his weight. The thin sheet of ice may bend many inches out of the plane, but again quickly returns to its position when the weight has passed over it. In masses however thick, the same elasticity is observed: it often bends with its own weight, though giving no sign of fracture.

The cleansing power of the freezing process is remarkable. Ice, on the muddiest stream, is clear as crystal. The muddy impurities may be caught up and suspended in the meshes of the general mass, but only mechanically, as it were. The ultimate crystal contains naught but purest water. Even the salt of the sea is eliminated by the freezing process. Cold, if intense enough, "will by its unaided action, independent of percolation, solar heat, depending position, or even depth of ice, produce from salt water a fresh, pure and drinkable element."

Along the northern coast of the continent advantage is taken of this quality of the purifying freezing process, where on cutting through the ice, for water, it is found to be putrid. Simpson found that even "when most nauseous, taking the precaution of imbibing it through snow purified it in some slight degree." I may add that water must be very bad indeed which is not rendered palatable by this method.

ICE BREAKING UP.

Many months after its formation—and the length of interval is as its latitude sometimes—the ice in the large rivers moves off as silently as it had formed months before; and what was on one day apparently a safe review ground for all the armies in the world, on another is off on its journey to the ocean, leaving a surface of

water, undotted, behind. Sometimes, however, the *debacle*, as it is termed, gives evidence of stupendous power and of irresistible force. When the face of the large rivers is yet frozen, the horizontal force of the imperfectly pent up current increases in strength in proportion with the increased opposition to its movement. Should the banks of the stream be of equal width, the whole may move off smoothly, and as noiselessly; but should, as at Montreal, any inequality in the margin present itself, it is impressed against with such force that the margin ice is rolled up as if it were paper, or crushed into a million atoms. The hummocking goes on till, by an unseen force beneath, layer is piled upon layer. Blocks of seemingly solid ice are twisted and curled or thrust up from below—they mount or slide up planes of ice till almost vertical, and topple over as if from a turning-lathe. Sometimes the pressure is so great that the cohesive force of the solid crystalline mass is destroyed, and it falls into small fragments or crumbles into amorphous masses. The direction is not always upward, and layer after layer takes a downward direction, and the rumbling and the grating below the seat of greatest obstruction is heard for a long distance. But the propelling power is too mighty to be resisted. It is estimated that opposite the city of Montreal, narrowed between its own greater island and the lesser of St. Helen's, the propelling power does not fall short of —. [Here I hoped it would be possible to give some idea of the enormous force, but Mr. Kennedy, from whom I sought information, and who has given me much that is valuable on another matter, writes me:—"I can form no estimate, in figures, of the enormous and complicated forces at work when the ice is moving."] Nor does the *debacle* take place noiselessly. As one mass after another rears and falls backward, crash succeeds to crash; sometimes it is a noise as of grinding machinery acting on hard limestone or harder trap rock; sometimes it is

like the whirr of a humming-top; sometimes as the discharge of distant infantry; sometimes like all those combined.

Those huge masses of ice which, after nine months' incubation, pass from their northern birthplace, downwards through Wellington Channel, Lancaster Sound and Baffin's Bay, travel on their journey of tender mercy, rendering distant southern portions of the globe agreeable, which, without their influence, would be uninhabitable.

RELATIVE TEMPERATURES.

On reviewing the differences between the climates of Canada and of Europe, we observe that the differences are mainly caused by winter. Mr. Murray, speaking of the difference, says:—"With respect to climate, this country exhibits, in many particulars, a striking dissimilarity to Europe. In the first place, the temperature is much lower under the same latitude; and this remark applies to the whole of North America. Thus Quebec, in 46° 49′, has almost the same latitude with Nantes in 47° 13′, yet the mean annual temperature of the former is 41° 74′; of the latter 54° 68′—a difference of nearly 13°. Edinburgh and Copenhagen, though more than 9° further north than Quebec, exceed it in mean annual heat—the one by 3°, the other by 4°.

The next distinction is the great difference in the temperature of winter and summer—the cold of the one and the heat of the other being much more intense than in those European countries where the annual mean is the same. . . . . The influence of the winds, which blow chiefly from the north-west, over a vast expanse of frozen continent; the position of the adjacent ocean, filled with fields and islands of ice, detached from the Arctic shores; the uncultivated state of the soil, covered with vast forests and swamps; these alone being the chief causes assigned for so remarkable a difference." The

whole Saint Lawrence valley may be put down, in round numbers, at forty degrees (40°) for the year.

The quantity of rain is about thirty-six inches ; and in the interior thirty-four inches.

It little concerns us what may be the temperature of the earth beneath our feet. The experiments recorded are few, but they tend to prove in Canada (what has been observed in the high latitudes of Europe) that beneath the frozen surface, the thermometer never sinks below the mean annual temperature, but is generally four, five, six, and sometimes seven degrees above it.

WINDS.

As it is my intention to describe the differences between the climate of this country and the climates of those countries (Italy, south of England, France, etc.,) which are the favorite haunts of the invalid, particularly of the consumptive, I may be permitted to dwell at some length on the peculiar character of the winds, and the causes of those peculiarities.

The winds, as we all know, are caused by the unequal distribution of heat ; and this unequal local distribution is the result of inequalities of the earth's surface ; differences of soil ; and the relative quantity of land and water.

The earth and the water—the continents and the oceans—touch each other only at their margins. A more intimate action upon each other is not possible, except by means of the most mobile of the elements, the atmosphere, performing in return the part of mediator. The winds are the instruments of this important work—the bearers of this wondrous water which renovates unceasingly the face of the mainlands and sustains their beauty. . . "To study the distribution of the rains and of the moisture," says Guyot, "is to study the course of the winds, which are their carriers. The winds are the consequence of a disturbance of equilibrium in the layers of the atmosphere,

and the tendency of the motion is to restore the equilibrium which has been destroyed. And *that* accomplished, the movement ceases and everything settles into a calm. The winds sweep in all directions; they carry with them, into the places where they go, the temperature and the moisture of the places whence they came. It is the winds which soften all the differences by blending opposite and extreme characters."

The south winds reaching us from the Gulf of Mexico and the Southern States are cooled by the more temperate air of our more northern regions, and deposit their moisture in showers, while the eastern winds bring with them the moisture from the ocean. The former, however, predominate.

Fortunate is it for us, and more fortunate still for the invalid, that the north side of this valley slopes so gradually towards the ocean, and that the high, bold Rocky Mountains and Mexican Cordilleras protect us so entirely from the Pacific.

The trade winds which reach us from the east are cooled in their passage across the Atlantic, but the heat lost is replaced by moisture. The same winds, reaching the opposite shores of Africa, are heated to an intense degree by their passage over the burning deserts of the interior.

The snow storms of winter are usually from the north-east by east, and in a line with the isothermals of the month in which they occur. The winds often attain a velocity of thirty-five miles an hour.

No matter from what point the wind first comes, it soon takes the general direction of the St. Lawrence valley. Easterly winds become north-easterly; and westerly become south-westerly. The latter blow, on an average, one-third of the year, and favor the mariner in returning to Europe. The easterly or sea breeze invariably accompanies the temperate intervals either in

winter or in summer; but in the former season the modifying influence is more easily ascertained by the thermometer than by our feelings, for the dampness which attends it chills us far more than a wind of much lower but drier temperature from another quarter. It is like the east wind reaching Edinburgh from Leith—piercing the warmest clothing, and, driving the blood from the surface, constringes the capillaries to prevent its return. Catarrh, bronchitis and pleurisy are not uncommon after those changes, which occur generally in March, April and the early part of May.

CLOUDS.

These, when observed, are most usually either the cirrus or cumulus variety. When the former, they usually travel eastward, and are very lofty. They have had their origin at the Pacific coast, and in the moisture-laden air which rises from the surface of the earth and the surface of the lakes as they travel eastward. These light cirrus clouds are supposed to be vapour in a state of congelation, but which again lose their congealed form as they pass through lower regions of the atmosphere to reach the earth.

The cumulus and strata varieties are still more frequently seen; while the nimbus, which forms so suddenly, and unburdens itself so quickly, is seen only during periods of extreme heat, and is often ushered in with lightning. All these varieties, except the last, are often seen blending their forms into each other, so that they combine the character of cirrus, stratous and cumulus; and the combination, especially of the two former, produces an effect indescribably beautiful.

But this is not a cloud-laden sky, and many days elapse without the presence of any of these varieties.

If the arbitrary scale, adopted by meteorologists to express the proportion of sky which is covered by cloud,

be used, then, between a cloudless sky, represented by 0, and a sky quite hidden by cloud, represented by 10, might the sky of Canada be fairly represented by 1 during the year.

During harvest-time the cloudless state of the sky permits the action of the sun's rays in ripening fruit and corn. The hay, which in early morning falls beneath the scythe, may be tossed and exposed, turned again and raked, and gathered into the barn ere the morrow. American writers, *per contra*, make the most of the "illuminated pea-soup atmosphere" of Great Britain, as they term it. Horace Greely, writing an account of his sayings and doings in the great metropolis for the readers of the New York *Tribune*, says:—"If the day of your embarkation be fair, take a long, earnest gaze at the sun, so that you will know him again when you return. They have something they call the sun over here which they show occasionally, but it looks more like a boiled turnip than it does like its American namesake. Yet they cheer us with the assurance that there *will be* real sunshine here."

FOGS.

The rapid evaporation which takes place all over Canada might *a priori* be supposed to affect the clearness of the atmosphere and to produce fogs and mists as in Great Britain; but it is not so. We rarely have those fogs which so torment the denizens of Great Britain. There the atmosphere is generally so near the point of saturation that the slightest difference of temperature precipitates at once the fog vesicle. But in our dry atmosphere fogs are rarely observed far from large bodies of water, and then only when a warm and still atmosphere is suddenly cooled by cooler water. Sometimes, indeed, in cold weather, the same effect is produced when the surface of the water is warmer than the atmosphere. In both cases, however, the condensation extends to a consider-

able height. The watery vapour which rises from the surface of the earth does not usually condense till it reaches the upper regions of the atmosphere. Hence fogs in the interior of Canada and along the water-courses are scarce. They are comparatively rare, except in the Lower St. Lawrence, and the noonday sun is seldom obscured by mists. While further westward "no south wind wraps the mountain top in mist," and the eye is not "bounded in its ken to a stone's cast." Steamers on the upper lakes are rarely hindered in their course by fogs; while those plying by night between Quebec and Montreal,—a distance of 180 miles—where headlands and distant lights guide the pilot in his narrow and tortuous course, the steamers arrive at their destination with the regularity of express trains. Even our highest hills—which, for want of better, we call mountains—are rarely enveloped in fog.

When Newfoundland shall have become an integral part of the Dominion this will require to be re-written, for there the warmth and moisture-laden air of the Gulf Stream is chilled by the cold air of the northern coast, and condensation goes on at the surface. But a fog, however dense, at Newfoundland is clean, and does not soil the linen; nor does it produce that darkness which a London fog causes. A Newfoundland fog can be overlooked from the mast-head, whereas from the top of St. Paul's, in London, murkiness reigns supreme, and there the "pea-soup atmosphere" of Horace Greely is not illuminated.

MIRAGES.

Since the great western provinces have been opened up, optical delusions—*mirages*—are witnessed on a scale of beauty hitherto unapproached. My talented young friend, Dr. H. N. Vineburg, who has lived at Portage la Prairie, writes me:—

"Providence has provided almost every portion of the

globe with some feature which lends a charm to the landscape. This is nowhere better illustrated than in the boundless prairies of the north-western portion of our Dominion. There, if anywhere, from conformation of the earth's surface, the poet's expression, 'dull, flat and profitless,' might be expected to be appropriate. But Nature, to counteract her own seeming deficiency, has availed herself of means of illusion, and by these means transforms a wild waste into a pleasant landscape. The monotony of a flat surface is relieved by beautiful mirages. On clear, bright days (and these are by far the most numerous), in whatever direction the eye ranges, a lovely sheet of water is seen in the distant horizon, with trees and houses floating on its surface. The houses, with their surrounding trees, appear as so many floating islands at a considerably higher altitude than the surrounding mountains. Very often, on driving over the prairie on a fine summer's day, I have experienced the most delightful sensation, and felt as if I were constantly approaching some fairy land, the description of which I had stored up in my youthful brain. I would drive along for miles having both the 'description' and the 'fairy land' in a hazy, pleasant distance, filling my mind with the most delightful thoughts, and being totally oblivious to the existing dreariness and solitude."

AURORA BOREALIS.

All over Canada, but chiefly in its northern parts, the display of *aurora borealis* is oftentimes magnificent—usually commencing in the north or north-east, and floating up towards the zenith; passing off towards the south-east and showing a tendency to "dispose itself at right angles to the magnetic meridian;" sometimes presenting stalactitic formations rapidly interlacing with equally brilliant stalagmites of surpassing beauty; sometimes shooting upwards and downwards in vertical lines; sometimes

appearing to "radiate from a luminous centre below the horizon;" sometimes presenting a concave arch of scarcely perceptible motion overhead; sometimes spanning the firmament with a beautiful bright yellow, or, though less often, deepest carmine of scarcely perceptible motion, tinged with red or tipped with green, regularly blended, or fantastically grouped; sometimes illuminating the heavens for hours; sometimes appearing and disappearing within a few seconds.

The aurora borealis seen in Canada is more beautiful as we proceed northwards, where the evenings are cold, calm and clear. The aurora has a marked effect on the magnetic needle, and atmospheric electricity is much more powerful when red *auroræ* exist than when they do not—and are accompanied with a large quantity of ozone. It has been observed that a white aurora in the north foretels cold and north wind; and a red aurora in the south indicates south wind and warm rain. In Canada it is commonly the former.

It is a matter of dispute whether the *auroræ* produce any audible sound, and conflicting statements have been made in support of, and against this. I incline to the former. Many times have I listened for some audible evidence of the occurrence; but twice have I had the opportunity of distinctly and unmistakeably hearing it. The aborigines of this country; the Esquimaux north of us; the Zetlanders and the Orkney men maintain the opinion that the aurora produces "a distinctly audible sound;" while those who deny the existence of sound, attribute what we hear to the congelation of the breath at a low temperature. It has been likened to the rustling of thick silk; but my medical hearers who honor me with their presence this evening, will understand me when I style it a fine crepitus as in pneumonia, and which has been likened, not inaptly, to the fine, crackling sound produced by rubbing the hair of the

head between finger and thumb near the ear; or, again, somewhat finer than, yet like the sound of, a sky-rocket discharged at a considerable distance. Dr. Hjaltalin, who has for some years been observing *auroræ* in Iceland, says he has heard this rustling six times in a hundred observations.

It is stated by Wrangel and others that the aurora is affected by the wind in the same way as clouds are. But I am not disposed to accept this assertion, as my own observation is to the contrary.

BAROMETER.

The following observations on the barometer are from the pen of Dr. Kelly. Instead of introducing tables, which are more or less fatiguing, I prefer the general observations in which Dr. Kelly's views are fully stated:—

"The barometer, as it is marked, is not a much more certain guide to the state of the weather at certain seasons than was Farmer's almanac, published some years ago, or a more recent one of like fame, which was said to speak by contraries. This much, however, may be stated as an approximation to truth: The barometer generally rises with west and falls with east winds; exceptions occur in greatest number between March and June, when the barometer frequently rises with north-east winds, which thus bring fine weather, as the west winds do at other seasons.

"As east winds are generally accompanied by rain or snow, and usually set in soon after the barometer has attained to a considerable height, the high barometer here, particularly if the rise has been rapid, often warns us of the approach of bad weather; while a very low state of the barometer, being the usual precursor of a west or land breeze, indicates that dry weather is at hand. The ordinary marks on barometers are here very bad guides indeed. For frequently, when the mercury has

marked '*set fair*,' rain or snow is very near; and when it has fallen to '*much rain*' we look forward with much assurance to dry, clear weather. The absolute height of the mercury gives no indication of the weather—all depends on whether it is rising or falling, or about to do so.

"The rise and fall of the mercury is often very rapid—sometimes one inch in twelve hours. The general range is not greater than is usual in temperate climates. . . . When there is a fresh, steady breeze from any point between N.N.E. and W., the mercury almost invariably rises; it rises with south-west winds when they succeed immediately to a gale from the north-east. At other times, winds from between the south and west are for the most part accompanied by a fall of the mercury. I do not recollect any instance in which the mercury rose with a fresh breeze from the south-east. With winds from between the north-east and east, the mercury usually falls; the exception to this, as already mentioned, occurs mostly between March and June. At all seasons we may occasionally observe the mercury to rise a little at the commencement of a north-east gale, or immediately before it; but the rise is transient and easily overlooked, the fall being the obvious and permament accompaniment. With south-west winds the mercury often falls half an inch or more without wet weather, but rain or snow are almost certain accompaniments of a fall, to even less amount, with a wind from the eastward. In only a few instances, and these chiefly in the spring, I have seen the mercury fall more than half an inch with a north-east wind without any break in the weather. The highest barometer I have observed was soon after a north-east wind set in. When the barometer falls very, very low, with light or variable winds, a gale or fresh breeze. from the north-west may be al most confidently expected Its approach is often denoted some hours before it reaches us, by the horizon clearing in that quarter."

I deem it unnecessary to add anything to the excellent remarks of Dr. Kelly, further than to state that I concur fully with him in what he has so concisely written.

FOREST AND FOLIAGE.

There is nothing which seems to influence climate more distinctly than the forests and herbage which cover the earth's surface; but trees and smaller plants; cereals and grasses; roots and mosses are the results of peculiarity of climate. Schoun says climate and vegetation stand in such close connexion that alteration of climatal conditions must necessarily bring about changes in vegetation; a total change where the climate is greatly altered; a partial when the alterations are slighter. Many meteorologists deny even this partial influence of their presence, or of their removal. That influence may not be on a scale sufficiently great to affect the thermometer at a distance; but the influence, limited as it is, is yet considerable, and a series of minor and local influences affects the general result. The presence or absence of natural woods, and their greater or less luxuriance, may be taken as an index of the climate, of the amount of humidity, and of the fertility of the soil.

In Canada, the oak, elm, beech, maple, linden, chestnut, ash, hickory, walnut and other deciduous trees flourish in certain latitudes, between regions where flourish umbrageous plants and evergreens, and the pine and cedar and still hardier mosses. But from one end of Canada to the other, the *mixed* forest is met with in rich luxuriance. The pine and cypress and beech and maple grow up together; while plants with shrunken leaves and feeble stems are nowhere to be found within our territory!

In all countries, Mr. Charles McLaren observes, having a summer heat exceeding 70° F. the presence or absence of natural woods, and their greater or less luxuriance, may be taken as a measure of the amount of humidity, and of

the fertility of the soil. Short and heavy rains in a warm country will produce grass, which, having its roots near the surface, springs up in a few days, and withers when the moisture is exhausted; but transitory rains, however heavy, will not nourish trees, because after the surface is saturated with water the rest runs off, and the moisture lodged in the soil neither sinks deep enough, nor is it in sufficient quantity to furnish the giants of the forest with the necessary sustenance.

CEREALS, FRUITS, ETC.

The wild grape is met with as far north as 52° north latitude, and Canada abounds, in many places, with this luscious fruit. (I speak here only of the *wild* grape—the naked summer temperature, though quite warm enough, will not ripen the European grape fit for wine.) Jacques Cartier, seeing what is now called Orleans Island, below Quebec, covered with grape vines, gave it the name of the Isle of Bacchus. But the name has disappeared, and the grape vines also, and the reason assigned for the latter by Dr. Larue is, that the inhabitants are all exemplary for their sobriety! The conditions which prevent the successful cultivation of the vine in Europe, beyond the narrow district already mentioned, obtain here likewise.

By the side of the fruits above mentioned, flourish the strawberry, the cranberry and the raspberry; while the evergreen pines are copiously intermingled with the oak, the elm, and others of ampler foliage. The forests abound in the deer and the rich fur-bearing animals that belong to an Arctic climate, the lakes and rivers with fish."

Canada, as a wheat-growing country, may be compared with Central Russia. From the valley of the Saskatchewan, and from far down the Mackenzie River in the north-west, to the Pacific; and along the huge chain of Canadian lakes and rivers, wheat of a whiter and finer description than that of Great Britain is grown, inferior in

gluten only to that cultivated near the shores of the Mediterranean. Bouchette (vol. I., p. 336), speaking of this matter, says:—"Quebec agrees in mean annual temperature with Christiana, yet wheat, scarcely ever attempted in Norway, is the staple of Lower Canada. The upper province nearly coincides with the north of England; yet the grape, the peach and the melon come to as much perfection as in their native soil. Even rice is found growing wild. In this respect, British America seems not to fall short of European countries within the same latitude. Its winter cold, at the same time, enables it to combine the products of the northern, with those of the northern temperate climates.

Western Canada enjoys a climate much milder than that of the eastern province. There is a mean annual difference of about six-and-a-half degrees between the two sections of the province. In western Canada, moreover, there is more of what may, in truth, be called spring. In his observations, Bouchette takes Quebec as the type of the colder eastern Canada, where it is less variable than in western Canada. In the former, there is sleighing during nearly five months; while in western Canada there are rarely one or two months of sleighing, and that, too, indifferent. Wheat is so far biennial that, for its first quality, it must be sown in autumn; but owing to the rigor of winter, or to the severe frosts and cold rain which precede the snow, or which occur after the snow has left the ground, it is difficult to raise it in eastern Canada. But this is compensated for by the strong, steady heat of summer, which matures all the grains fitted for bread with most surprising rapidity. The late Mr. Evans—and I can mention no higher authority—says he has had "wheat in ear nine weeks after it was sown." The high summer temperature ripens for us plants and foreign vines which, were it not for the high curve of heat and moisture, would only reach us from abroad.

The Indian corn (maize), with its stalks abounding in sugar; melons; pumpkins; squashes, grow luxuriantly in the open air all over the country.

Sir George Simpson* says the vine is abundant on the Kamniistoquoia, a tributary of Lake Superior from the north. (Les Mém. Hist., pp. 59, 61.)

If I have dwelt at some length upon the productions of the country, it is in illustration of my subject, and from the conviction that the labor will not be lost of him whose stalwart arm levels the forest, drains the swamp, upturns the glebe and plants the corn so that many blades may grow where none had grown before.

There is one more circumstance to which I should have alluded earlier; but to which I should wish to draw attention before leaving this part of the subject:—In some winters, as great a degree of cold is experienced for a short time in cities south and west of us (New York and Boston, for instance,) as at Montreal, Quebec or Rivière du Loup; while in some summers, as high a temperature is occasionally observed, for a short time, in those more northern Canadian cities and towns as in those above-mentioned in the neighboring states.

The temperature, as already [illegible]equently noticed, is

* The same authority informs us that buffaloes have, of late years, found their way through the Rocky Mountains to the headwaters of the Saskatchewan, where they roam in countless herds. The grass to feed them, says Sir George, is rich and abundant, and the buffaloes winter there, together with the domestic animals taken thither for the use of the white men and Indians. Those simple facts are ample proof of the climatological and productive capacity of the country. The plains of the Saskatchewan measure 500,000 square miles, and, according to Lord Selkirk, who attempted colonization, are capable of supporting 30,000,000 inhabitants. "A European area," says Professor Hind, "similarly situated east of the tenth degree of longitude would comprehend very nearly the whole of England and Ireland, part of the German Ocean, the English Channel, the north-eastern corner of France, the whole of Belgium and Holland, and the greater part of the valley of the Rhine, together with the kingdom of Hanover."

higher in western than in eastern Canada; yet a degree of 95° in the shade is not unfrequently observed at Montreal and Quebec—which is perhaps as high a temperature as is met with in any part of British North America.

FUTURE CLIMATE.

What will be the ultimate influence, upon the quality and temperature of our climate, of the removal of the woods and forests into waving hay and wheat fields? This is a question which I approach with some degree of diffidence—finding myself, as I do, out of harmony with many whom I have hitherto been well pleased to follow. Many meteorologists maintain that climate is permanent; that vegetation is its effect, not its cause; that so long as hills and mountains, rivers and valleys exist; and so long as the sun continues to give out his accustomed heat, so long will the permanent conditions of climate obtain. Granted that solar radiation is permanent; that the temperature of the mass of the earth does not sensibly alter; and that vegetation is wholly caused by climate—the changes effected upon the surface of the earth by human industry (though probably not so great as is supposed by some) are not to be ignored. True! that Arago, the greatest of French meteorologists, says that the temperature of countries like Egypt has not changed since the time of Moses; that Humboldt, the greatest—unquestionably the greatest—of German philosophers, denies that changes have occurred in the temperature of North America, in consequence of the destruction of forests; and that Sir William Dawson coincides with him, I take the testimony of other authorities, supported by that of history, in favor of the view that the improvement of the soil generally means improvement in the quality of the air:

Prof. Agassiz thinks the continent of North America was once covered with ice a mile in thickness thereby agree-

ing with Prof. Hitchcock and other eminent geological writers concerning the glacial period. In proof of this conclusion, he says that "the slopes of the Alleghany range of mountains are glacier-worn to the very top, except a few points which were above the level of the icy mass. Mount Washington, for instance, is over 6000 feet high, and the rough, unpolished surface of its summit, covered with loose fragments, just below the level of which glacier marks come to an end, tells that it lifted its head alone above the desolate waste of ice and snow. In this region, then, the thickness of the ice cannot have been much less than 6000 feet, and this is in keeping with the same kinds of evidence in other parts of the country—for when the mountains are much below 6000 feet, the ice seems to have passed directly over them; while the few peaks rising to that height are left untouched. The glacier," he argues, "was God's great plough, and when the ice vanished from the face of the land it left it prepared for the hand of the husbandman. The hard surfaces of the rocks were ground to powder; the elements of the soil were mingled in fair proportions, granite was carried into the lime regions, lime was mingled with the more arid and unproductive granite districts, and a soil was prepared for the agricultural uses of man. There are evidences, all over the polar regions, to show that at one period the heat of the tropics extended all over the globe. The ice period is supposed to be long subsequent to this, and next to the last before the advent of man."

Sir Wm. Logan, with that reserve and caution which so distinguished him, says:—"Rounded, grooved and polished surfaces are often found on the older rocks, where these are naturally exposed, and are met with in still greater perfection wherever the ancient superficial deposits which cover them are artificially removed. The process which produced these results must therefore have

been contemporaneous with the transport of the drift over the surface, or anterior to it. These phenomena have by geologists been attributed to various agencies, but the evidences afforded in Canada appear to favour the supposition that *they have been caused by the action of glaciers.* Along the whole of the southern boundary of the Huronian and Laurentian hills, from Lake Superior to Labrador, the rounded rocks, or 'roches moutonnées,' are very conspicuous, and the ordinarily rounded outline of these hills may be due to glacial action. On Lake Superior the general direction of the striæ is southward. . . . . Along the north shore of Lake Huron, and on the multitude of small islands adjoining it, the rocks are rounded and grooved in a very striking manner. . . . . At one place, near the Bruce Mines, the grooves were observed to run under an overhanging mass of rock and to mark the wall and the roof. These, it would seem, must have been caused by fragments imbedded in the yielding ice of a glacier. In Lake Temiscaming also, a long narrow expansion of the Ottawa, the rocks are furrowed in such a manner as to suggest that it is the result of glacial action. . . . . The furrows conform in a general way to the directions of the river valleys, the limits of which appear to have guided the moving masses, producing the present grooves. . . . . The distribution of the innumerable lakes, which appear scattered as if at random over the Laurentian region, is often well explained by the peculiar geographical distribution of the strata. . . . . Combined with the unequal wear dependent upon the hardness and toughness of some parts of the deposits, and the softness of others, ... it appears probable that one of the main erosive forces has been glacial action. Not only the lake-basins, but many of the river-valleys, in which the lake-basins are only deeper parts, run on the bands of limestone, and may be due to the same cause. The arrangement of the great western lakes of Canada is

traceable to the arrangement of two parallel zones of strata, the softer members of which have yielded, with comparative facility, to the wearing agency, producing the excavations which hold the water. These great lake-basins are depressions, not of geological structure, but of denudation; and the grooves on the surfaces of the rocks, which descend under their waters, appear to point to glacial action as one of the great causes which have produced these depressions."

I have quoted, at considerable length, from Sir Wm. Logan's chapter on "Superficial Geology," in his Geology of Canada, and I could have quoted no authority which would carry more weight in Canada, where the grand old man had devoted a long life to the elucidation of questions relating to the geology of his adopted country.

We have not now to disintegrate and scoop out by means of those huge masses of ice which, in the long past, served their economic purpose of preparing this portion of the continent for the habitation of man; but something of the same kind of action, though insignificant in degree, may be noticed at some seasons after the breaking up of the ice in our large rivers. Any one who has examined, at low water, the Boucherville islands, below Montreal, will have noticed in some places the deep groovings and scorings of their surface. I have more than once examined, with great interest, a long, shallow, narrow island opposite Cap St. Michel, below Varennes, which, after every considerable ice-shove, is denuded of every living thing. Deep markings, in a line with the current, traverse it from end to end. But one groove deeper than the rest comes to an abrupt termination by a boulder of many tons, which, in the giant grasp of the moving ice, has been carried from the bed of the river up to the top of the island, marking its course by a deep tracing that a hundred horses could not have furrowed, till imbedded in the earth, where it still (1884) awaits

the icy grasp in a future season, to be still deeper imbedded, or passed over the island to deeper water below.

But changes to and from a glacier period are not the only ones which have occurred in the geological history of this country. Evidence is not wanting to show, in conformity with the views of Agassiz and others, a former temperature as much higher than the present, as the glacial period was lower.

The coal flora, which "has yielded to the researches of botanists more than 700 different species of plants all distinct from any now existing," gives evidence that even the surface of the globe was influenced then, as now, by latitude and longitude—for while there is much identity between the vegetable remains of that period met with all over Europe, in our coal beds species and genera have been discovered quite distinct from those of Europe, establishing the fact that where they once grew in such numbers the land was warm and the atmosphere moist, for the ferns and other vegetable productions met with, so eminently sensitive, as Hooker says, to changes in the amount of vapour, could flourish only with shade and moisture. Down deep beneath our frozen surface are now deposited, in sedimentary strata, the flora and fauna of hotter climates. In the coal fields of Nova Scotia are to be met the remains of umbrageous trees and coniferæ, which have now no living counterpart in the Dominion.

When the nations bordering the Mediterranean extended their conquests and civilization to Britain, they described the latter as a cold, inhospitable region, fit only for barbarians.

In history, we read of fairs having been held on the Thames in winter. Yet Great Britain could not be so greatly influenced by agriculture as this country; the islands are small, and every portion of them, whether partially protected by forests or not, feels, more or less, the humid influence of the surrounding sea.

"The climate of Italy," says Dr. James Johnson, "has undergone nearly as great a revolution as the political power or moral circumstances of its inhabitants since the commencement of the Christian era. In the time of Ovid, the Black Sea, on whose dreary shores the effeminate poet ended his days in hopeless and rather unmanly exile, was sometimes locked up in ice for years in succession." That the climate of the whole peninsula has greatly altered within a comparatively recent period, is proved by the ancient moraines of great size, and other glacial evidences. The poets are full of descriptions of the frozen Tiber, and of the cold of Italy in winter. Pliny, the younger, informs us that he was unable to raise the olive and myrtle in the open air at his country seat in Tuscany, where they now flourish luxuriantly.

In France, the changes in climate have been equally noteworthy. In the time of Augustus attempts were made to naturalize the vine in the north of Gaul, but the cold was too great. "The intense cold of a Gallic winter," says Milman, "is almost proverbial among the ancients." "The cold was intense to the north of the Cevennes," says Strabo. In the time of Julius Cæsar the Seine was frozen over every winter, and that great captain exercised his soldiers, horses and chariots upon the ice. A small glacial fringe may now be here and there seen during severe cold days, but the Seine remains navigable. My friend Dr. Meding, of Paris (to whom I am indebted for much useful information on this subject), says:—"Le climat de Paris est en général doux et tempéré, mais assez humide. On a beaucoup parlé de l'influence qu'ont eue sur le climat de la France, et en particulier de Paris, les abattis de forêts, le dessèchement des marais et des étangs, et le changement dans les cultures; cette question a vivement préoccupé tous les savants, tous les esprits observateurs. . . . . Ce qu'on ne peut nier, non plus, c'est que le climat de Paris a été

considérablement modifié depuis que cette ville a vu disparaitre la large zône de bois et de forêts qui lui formaient une ceinture sanitaire en arrêtant les vents, en retenant les brouillards que leurs feuilles absorbaient pour les rendre à la terre. . . . . La température de Paris semble presque avoir éprouvé depuis une succession de siècles une augmentation de chaleur. On croirait difficilement aujourd'hui, qu'autemps de la domination romaine, la plupart des rivières, au rapport de César, y gelaient chaque hiver, et avec une force telle, qu'elles supportaient des armées entières avec les chariots et les équipages."

Robertson, in his history of America, seems to admit the ameliorating influence of culture and other circumstances on climate, in the following words :—"And if ever the progress of culture and population shall mitigate the extreme rigour of the climate in the more northern districts of America, Hudson's Bay may become as subservient to commercial intercourse in that quarter of the lobe as the Baltic is in Europe."

From these, and other statements I might furnish, as well as from my own settled views I incline to the belief, that if we alter the hydrographic condition of a country, all is altered. And how rapidly is that condition being changed here in Canada! At this moment the monarchs of the forest are falling by tens of thousands; and while the more valuable serve to build the navies of other lands, the less valuable, with the stumps and brushwood, are consumed where they lie.*

* Dr. T. Sterry Hunt, in his Rep. Geol. Survey of Canada, 1853-56, speaking regretfully of the indiscriminate destruction of Canadian forest trees, says :—"The colonist, wishing to render the forest available as an immediate source of gain, has thought rather to cut down and burn the wood for the sake of its ashes than to cultivate the land thus cleared. The effect of this short-sighted policy in thus destroying our forests is already beginning to be seriously felt in some parts of our country, where the early settlers, looking upon the forest as their greatest enemy, sought only to drive back its limits as fast and as far as possible, and

The soil is exposed to the genial influence of the sun and wind; snows, which were once preserved as in an ice-house till May, now disappear a month earlier; and the small creeks and rivers, swelled to overflowing in early spring, during summer are dry. Memory carries me back to my own pretty Hinchinbrook. Many, many beautiful small streams trickled unceasingly over the banks to swell the larger river; but, after a lapse of many years, the little streams after early spring are no longer visible. The axe has been laid to the tree, and the waving wheat has usurped its place. Ask (as I have done) where are the little streams which once gladdened our childish fancy, and we are told: "The streams have been dry since the trees were cut down." I accept that theory till furnished with a better. Malte Brun attributes the severe and long-continued cold of unsettled northern countries "to, among other causes, the absolute want of inhabitants, and consequently of cultivation."

"When we remember that the Tiber was formerly frozen annually; that snow was usual at Rome; that the Euxine Sea, the Rhone and Rhine were almost every year covered with a strong sheet of ice, we may look forward to yet greater modifications of the climate of Canada."

The above is from the pen of Mr. R. Montgomery Martin, F.S.S., who states elsewhere that the climate of Canada has undergone a change, and adduces tables in support; and that since 1818 the change has been considerable, partly owing to the motion of the magnetic poles and the clearing consequent on the cultivation of the country, the effect of which is mainly observable in the length and duration of summer, and consequent shortening of winter. The winters of New Brunswick, according to a seemingly

have thus left the borders of the St. Lawrence nearly destitute of wood; so that the cultivator is often obliged to bring from a distance of many miles that fuel which in a country like ours is such an important necessary of life."—P. 418.

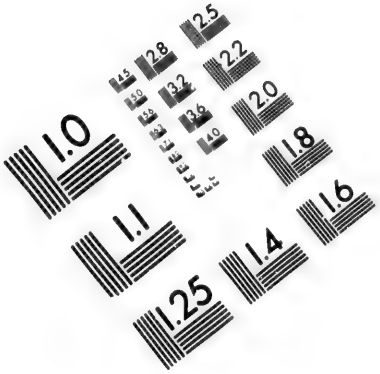
well-informed writer, have been shortened two months by this cause alone.

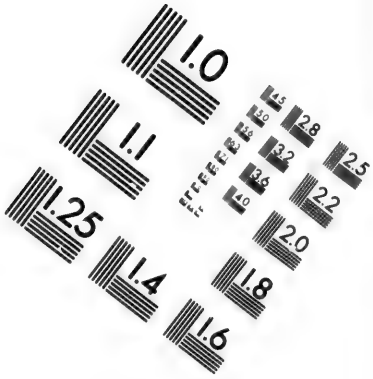
Were Canada a vast inland continent, the removal of the forests would increase the heat of summer; but surrounded by cool water, penetrated in all directions by water and studded with lakes, the winds from the north-east, north and north-west would cool the air of summer more than now, while the winds from the south would continue as heretofore.

Dr. Sterry Hunt, in the paper alluded to at a preceding page, says:—"But apart from their value as sources of fuel, the importance of occasional forests in breaking the force of winds, and tempering both the cold blasts of winter and the heat and dryness of the summer, should not be overlooked in a country which, like ours, is exposed to great extremes of temperature. The unwise policy which formerly levelled with an unsparing hand the forests of Provence, has rendered portions of that country almost a desert, exposed to the strong winds which descend from the Alps. Future generations may plant forests where we are now destroying them."

The exhaustive Malte Brun says that the same changes as to climate are taking place in Canada which were observed in Europe, when "the dark masses of the Hercynian Forest were filled and its morasses drained by the laborious arms of the Germans; and the climate, every season becoming more mild, has undergone a change of 8° or 10° on the average of the year since the efforts of European industry were first applied to the cultivation of their country."

Were I to say much more on this part of the subject, I should be pretending to knowledge which I do not possess, and have no leisure to acquire. But I may state, in support of the views advanced, that Sir David Brewster admits that changes of climate do take place; that Dr. Williams, of Harvard University, states that the winter is less severe; and that the cold weather does not come on so





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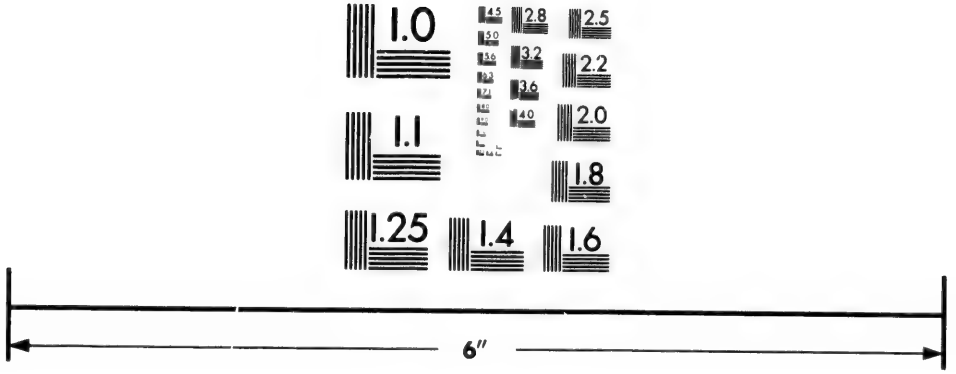

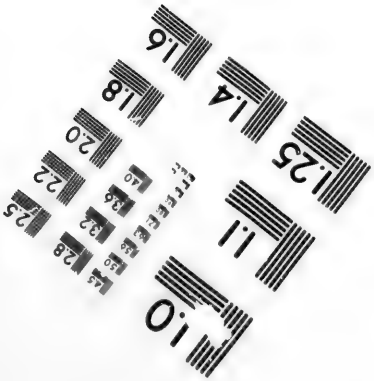

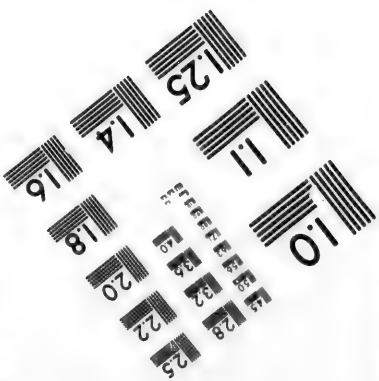

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soon as formerly; and that Père Charlevoix says:—"On a beau dire que les hyvers ne sont plus aussi rudes qu'ils l'etaient il y a quatre-vingt ans, et que selon toutes les apparences ils s'adouciront encore dans la suite." Judge McCord, who some years ago devoted much attention to meteorology, and, while filling, in this society, the office which I now hold*, succeeded in directing the attention of the British Government to the question, thinks the extremes of heat and cold are not so great as formerly. The learned judge's opinion is expressed in the following words:—"I am distinctly of opinion that if the extremes of heat and cold, and their respective durations are less intense and long (which I believe), the mean temperature of these provinces has not materially changed." Dr. Archibald Hall's opinion is to the same effect. Every old *habitant* will tell us he is sensible the climate has been improved by clearing away the forests. He will tell us that certain of the early crops—and all kinds of grain are now sown earlier than heretofore—ran great risk of being injured by the frosts; but that now the risk is comparatively trifling. He distinctly traces the simultaneous disappearance of forests and untimely frosts, and says it is now somewhat unusual, in settled districts, to notice the occurrence of

> ". . . An envious sneaking frost
> That bites the first-born infants of the spring."

That opinion is a very prevalent one, and has been noticed by many writers. Mr. Manning says:—"There prevails a general opinion that since British America has been partially cleared and cultivated, the extremes, both of summer heat and of winter cold has been seriously mitigated."

On the other hand, for regions further north, Dr. Hayes says there is no doubt, in his mind, that at a time within historical and very recent limits, the climate of the Polar region was milder than it is now.

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* This was written twenty-five years ago.

The removal of the forests and the drainage of swamps have had a most salutary influence upon the health of the people. Intermittent fever, which only a few years ago afflicted almost every European who visited certain districts in western Canada, is rapidly disappearing; and localities over which "the tertian shook his chilling wings" are now the most healthy. Agriculture has accomplished what medicine could not, and how? Let us contemplate a desert country: the rivers, abandoned to themselves, become choked and overflow; and the waters serve only to form pestilential marshes. A labyrinth of thickets and of brambles overspread the most fertile hills. In the meadows, the unsightly wild mushroom and the useless moss choke the most nutritious herbs; forests become impenetrable to the rays of the sun; no wind disperses the putrid exhalations of the trees which have fallen under the pressure of age; the soil, excluded from the genial and purifying warmth of the air, exhales nothing but poison, and an atmosphere of disease gathers over all the country. But what do not industry and perseverance accomplish? The marshes are drained; the rivers flow in their accustomed channels; the axe and the fire clear away the forests; the earth, furrowed by the plough, is opened to the rays of the sun and the influence of the wind; the air, the soil and the waters acquire by degrees a character of salubrity; and vanquished Nature yields its empire to man, who thus creates a country for himself.

I have only, in conclusion, to allude to the

CHEMICAL CONSTITUTION OF THE ATMOSPHERE.

As the law of the mutual diffusion of gases is universal, one might suppose the chemical composition of the atmosphere would be the same in all parts of the world. But this is found not to be the case. The atmosphere of two contiguous localities is often known to disagree. Yet the

body in a state of health cannot—and no instrument yet discovered can—indicate that difference or its causes. But the most sensitive of all instruments, the body in a state of disease, takes early cognizance of it. To this I shall have occasion to allude in the second part of this paper. Suffice it, at present, to state that there is a difference between the chemical composition of the atmospheres of this country and of Europe. Whether that difference is due to the accidental admixture of stimulating gases with the air of Canada; whether the relative amount of oxygen and of nitrogen in the atmosphere is changed; whether the former is increased (a cirumstance difficult, with a knowledge of the law of definite proportions, to believe); whether oxygen is given out in the process of vegetable growth and mixes with, but forms no essential constituent part of, the atmosphere; or whether, in the same process, the air is deprived of a small amount of that carbonic acid which it usually contains, I am not in a position to determine.

Of all the antiseptics in use, or hitherto discovered, a cold frosty air is most certain in its action. Cold prevents the motion of particles; and particles, in losing motion, lose the power to decay. The influence of cold is not confined to organic matter on the earth's surface, but extends to that floating in the atmosphere; while it removes with it the vapour there suspended. Our coldest days, as they are the clearest, are also the purest.

In Canada the atmosphere is chemically so pure that cold is not essential to the preparation of food, nor to its preservation. Meat can be cured or dried in the sun without the aid of salt or smoke, and this in the hottest months of the year. The Indian women practice this mode of preserving the meat of the buffalo and other animals, and, as Catlin says, "in all the different latitudes of our Indian country."

AIR OF CANADA STIMULATING.

But be the chemical constitution of the climate what it may, the air of Canada is unquestionably far more stimulating than is that of Great Britain, for instance. That circumstance has been recognized by almost every one who has visited this country. It was such as to arrest the attention of the observant George Combe, author of "The Constitution of Man," when visiting this continent. Combe (p. 59), speaking of the climate of the United States, says it is felt "by most British travellers to be highly stimulating. The air is drier, and it appears to me to be more highly charged with electricity than that of Britain."

Old country persons, long accustomed to add wine (or something stronger) to water for their stomach's sake, perceive, after their arrival in Canada, that stimulating beverages do not agree with them quite so well, or rather *dis*agree with them more, than when in Europe; and, ignoring the hyperstimulating influence of our dry climate, they seek, in the fancied impurity of the article, for the cause of this difference. Canada must, from necessity, if from necessity alone, become the abode of temperance.*

In Canada the atmosphere almost always exhibits a sensible electrical condition, be that positive or negative. In clear weather the atmosphere is vitreous, or positive; and during hail and snow that condition is usually preserved. When the clouds drift with violence, the electricity often becomes negative; but in clear, frosty weather—that is, during the greater part of the winter

* Not many years ago spirit rations were served out daily to the soldiers of the United States Army; and that this duty might be effectually executed it was the usage of the service, in many stations, to have it performed under the immediate superintendence of a commissioned officer, who certified to his commanding officer "that he had actually seen each man drink his drams." A few years later, and an intelligent general in the same army issued orders for the suppression of the liquor traffic among the soldiers in camp and field; and riot, disorder and disease abated. How much more humane and wise was McLellan!

season,—the electrical condition is positive. The same obtains in foggy weather. A change of wind, however, may change that electrical condition; or may increase or decrease it.

SPECULATIVE.

This brings me to the second part of my subject—the climate in its relation to life and health. As that part is a large one, I shall not enter upon it now, further than by asking: what are the effects of our Canadian climate upon Europeans? Is life more intense? Is the existence (and I do not doubt its existence) of a tonic excitant in the atmosphere prejudicial or favorable to mental and physical development? Is this climate favorable or unfavorable to life? Favorable or unfavorable to health?

We all know that dryness of the exposed tissues attends even a short residence in Canada. That dryness is visible in the skin, hair, mucous membranes, etc. Physicians recognize still further changes in the internal organs, especially in the lungs and liver. The whole temperament changes. Are these changes favorable to life or are they not? These are questions which I long since proposed to myself, and I apprehend that their solution forms a worthy and no unimportant object of professional study. Such partial answers as I am as yet able to give to them, will be conveyed in a future lecture. But as curiosity is ever upon tip-toe, I shall anticipate the answers so far as to say that the maritime and continental features, harmoniously blended in our climate are, methinks, favorable to the highest development of a hardy, long-lived, intelligent people. And may that people be a *Canadian* people—not loving the land of their European forefathers less, but loving Canada more—to whom will belong the privilege, the great privilege, of aiding in erecting, in what was so lately a wilderness, a monument of liberty and of civilization, broader, deeper, firmer, than has ever yet been raised by the hand of man.

PART II.

When the traveller visits other countries in Europe, he sees everywhere traces of ancient splendour, and evidences of industry and magnificence, the result of wealth and industry in its former inhabitants. But when, in obedience to those laws which he may not understand or think of, but which "uniformly govern the growth, grouping and migrations of humanity" in, and to, every quarter of the globe, the European immigrant quits his native shores for our Canadian provinces, he leaves behind him the air he used to breathe and the soil whereon he trod. It is probable that a change of place is accompanied with a less or greater change of occupation, food, amusements, habits, &c., and he is exposed, at once, to a new set of influences, not always of his own choosing. He perceives that the mornings and the evenings are clearer, though there may be nothing of that "little gloaming light, much like a shade"—as Spenser styles it;* the skies, brighter; the air, in winter, colder; in summer, warmer than those to which he had been accustomed.

If he has eyes to see—and if not, this is not the place for him—he will perceive that the people among whom he now finds himself are different. If he is thrown among those who like himself came from Great Britain, he may notice they are paler among the higher classes and less

* This would be true of the greater portion of Ontario and Quebec, where there is but little pleasant lingering twilight, and where darkness follows quickly the rays of the setting sun; but in, and north of the Athabasca district twilight lasts from sunset to sunrise, and is beautifully soft and clear.

ruddy (except in winter); browner among the out-door artizans. All look somewhat drier, so to speak. If he is from that less prosperous island, where rents are said to be proportionate to apparent comforts, he does not notice here, where it is happily unnecessary, any attempt at concealment of the better part of the people's condition, but rather an ostentatious display of comforts—if Crabb will permit the use of that substantive outside of his own country. He will probably observe that, among the thoroughly acclimatized section, the foreheads of many are higher, but not broader, and, at an earlier age than in Europe, grey, or more freed from hair; the nose sharper and more pointed; the lower jaw narrower; the shoulders squarer, and often higher; and the complexion more sallow, as if bronzed by the intemperance of the seasons.

He will also not fail to remark that the herbage, though not less luxuriant, is different: the cowslip, the hawthorn, the "crimson-tipp'd" daisy, the heather and the primrose may not meet his eye; but sturdy grasses and more gorgeous, yet less fragrant flowers surround him on every hand. The differences in the flora are marked: the species are distinct, although the genera are the same. But the differences seem to be more largely due to local conditions, than to conditions as between the two countries. In Europe the greater brightness is observed in flowers grown near the ocean, consequent on the greater humidity of the atmosphere. Here that brightness is noticeable at a great distance from the sea, where our large rivers and vast lakes furnish that humidity far inland.

If a map is laid out before him, he is amazed at the prodigious extent of the country he has come to inhabit, exceeding, as it greatly does, that of the whole United States of America. If he measures that extent with a compass, he finds that Canada is about a ninth of the whole terrestial globe (Malte Brun says the exact amount is 4,109,630 square geographical miles); and that,

in addition, it is indented with lakes and rivers of about one-third as great in extent, giving a water surface of 1,340,000 square miles.

If he penetrates the forest, the variety of trees will astonish him—particularly if in autumn—when every tree shows an infinite variety of tint, of green, orange, yellow and red. He will find form succeeding to form, till the vegetation of the temperate zone passes rapidly before him. The oak, taller and less gnarled; the sugar maple; the pine; hemlock; birch, &c., remind him of his changed abode, and may, perhaps, lead him to exclaim with the observant Charlevoix, though in a different language: "Nous sommes au milieu des plns grandes forêts du monde; selon toutes les apparences, elles sont aussi anciennes que le monde même, et n'ont point été plantées de mains d'hommes: à la vue rien n'est plus magnifique."

The birds warble to him in unknown strains, and while decked in much gaudier colours, they sing less sweetly. Many of the birds, which in Great Britain make the groves and sky resound with the music of their carols, do here but chirp and twitter. Some genera of the feathered tribe are peculiar to the New World, as the genera of toucans, humming-birds, tinamores, wild turkey, and others.

The quadrupeds,* and particularly the horse, have undergone marked changes, and many of the animals, domestic and others, now met with, are not identical with those in Europe—but allied in species.

If he has a mind capable of generalizing, he will perceive that, even in this diversity of phenomena around

*Some of the large quadrupeds of the old world have no living representatives in the new. The elephant, camel, giraffe, rhinoceros, hippopotamus, have no living animals to equal them here; but ever and anon, the fossil remains of the mastodon and the megatherium are discovered, to show that those monsters once lived and had their being here; but now, being unnecessary to the more advanced condition of the new world (geologically older, it may be observed,) had died out and were buried.

him, there is unity; and that however different in mould and figure are objects with which, in other forms, he was more familiar, that here, as elsewhere, there is a blending quite as harmonious. If the vegetation is of a character so widely different as to present a physiognomy somewhat strange to him, yet will he recognize that here also there is affinity between form and form.

If he dip beneath the surface, however, he will there meet with the same inclined strata that he had seen in Europe, telling him "that the solidification of the earth's crust is altogether independent of climatic influences."

That a change has taken place in the European constitution after a longer or shorter residence in this country, every one (except Mr. Latham, perhaps,) must admit. The high color which flushes the cheek, and reddens the lips of Europeans, fades somewhat. The skin is less soft and moist; the hair becomes drier and straighter; and the teeth —thanks to a pernicious mode of living to which I shall allude later—decay sooner. The fat which cushions the muscles, and gives a roundness to the general outline, is partially absorbed; and the muscles themselves, or their tendinous extensions or their aponeurotic expansions, become more prominent, and especially about the face, giving to the countenance a more thoughtful—some think a more intelligent—certainly a more serious expression. Chubby-faced women, and round, fat, oily men are less frequently seen here. In a word, the "whole model of the barren earth which serves as paste and covering to our bones" is changed.

Viewing these differences—and they are such as to arrest the attention of the least observant—he may, perhaps, fail to notice that, after a time, he himself has taken a new form of existence; that new habits are springing up within him; that new ideas, not always better ones, perhaps, are taking possession of his mind. Nevertheless, although he may not know it, he thinks and acts differ-

ently, and at length becomes sensible that a "change has come o'er the spirit of his dream;" that it has become necessary his natural and national character should be (and it is being) modified to suit the new order of things which he observes to exist around him; that he has become, in fine, like Sir John Cutler's silk stockings, which were darned for so long a term of years with worsted by his housekeeper, that it would be difficult to say at what precise period they had lost their identity—as the German "Walladmer" was said to have been darned by De Quincey. He may, and often does, no doubt, feel regret that the home of his sires and of his childhood is far away; but he has little time for pensive thought and melancholy. There is soon noticeable a something in his step—a something in his countenance—which proclaim a life of ceaseless activity.

He will not fail to observe that business and pleasure or recreation are here not so well associated—that each is not relegated, for a time, to what is appropriate to each—as in Europe: toil in the former is more continuous and severe—less interrupted; and pleasure or recreation partakes more of the character of dissipation, save when an element of refinement had been blended with the more aggressive element of enterprise. Over-exertion in those who are compelled to work; and too little exertion in those whose labour has earned for them an early competence, here produce the same noticeable results.

The emigrant of to-day—

> "On bold adventure to discover
> * * * * if any clime, perhaps,
> Might yield him easier habitation,"

notices differences when he sees the children of the immigrant of fifty years ago, and compares them to those in like circumstances in the country whence he and their parents came.

The climate of Canada will best be considered under its

two opposite aspects of HEAT AND COLD; spring and autumn, being much like those seasons in Europe, require but little special notice.

Heat.

During the hottest days of summer, when currents of air strike us from the south as if from the mouth of a furnace, there is never experienced what occurs to travellers in Africa and in some parts of Asia, and even in the south of Europe, where the pores of the skin are shut, as if by cold, and cutaneous exhalation is checked. Here, on the contrary, the exhalant apparatus is more than usually active. In Asia and Africa, cloths kept constantly wet are hung up at the doors and windows; in Canada we carry those cooling contrivances about with us. Residents in Canada are, perhaps, not aware of, or, if aware, are not sufficiently grateful for, a quality of atmosphere which thus preserves, in a remarkable manner, the temperature of the body, apparently independently of the elevated temperature surrounding it.

One of the primary, or at least, most conspicuous effects of heat upon the inhabitants is exerted upon the functions of the skin and liver. Even, with the more robust, there is, during the hot season, a relaxation of the solid tissues, and a more or less abundant transpiration. With all, the movements are slower, and with a greater disposition to repose; thirst is increased, and the fluids taken to relieve it, pass quickly, through the circulation, to the skin. Finally, the stomach participates, and craves less for food than for drink; but whether this is a result or a cause of the general depression, is differently determined.

As to the influence of the heat of our summers on that organ, which, next to the skin, seems to take cognizance of an exalted temperature, it may be observed that sudden heat has not the effect of invariably increasing the biliary secretion; so that hepatic affections are unusual in June or early

in July, or much before August, when a high temperature has continued for a couple of months. The heat of summer continues quite long enough for comfort; but stops short ere bilious affections have become frequent. A few additional degrees of heat, and a few weeks longer continuance of it, might, perhaps, develop those putrid and malignant disorders of hot countries, which, in Canada, are happily unknown.

But we must not attribute to high temperature solely, the influence of other causes; for many there are—myself among the number—who are disposed to think that high temperature, even when long continued, is incapable of directly producing disturbance of the functions of the liver. The high temperature and more rarified air indispose persons to exercise; and if they continue to take the food they are in the habit of taking in colder seasons, the carbon is too great to be excreted from the lungs as carbonic acid, and from the liver as bile. The rarified condition of the atmosphere diminishing, at the same time, the excretory power of the lungs, the carbon of the tissues, and (if much be consumed) of the food, is converted by the liver into fat. But a season approaches when that fat will be serviceable to us, and will enable us to resist, with comfort, the extremest cold.

Liver affections are uncommon in persons who keep up free cutaneous exhalation by active exercise—there being a marked sympathy between the skin and liver; and they are rarely met with in those who, while taking active exercise, are temperate in eating and in drinking.

In the heat of summer, other alterations take place in the economy which teach one how to accommodate one's self to altered circumstances. The sensation of warmth would be almost intolerable did not kind, beneficent Nature open those innumerable pores, the flood-gates of the skin, and bathe it with a fluid which, during evaporation, prevents the temperature rising above the healthy standard. Whether the maintenance of a moderate temperature in

the body in a hot surrounding medium depends on the principle of evaporation; or whether animal heat combining with the transuded fluid passes off with it, it is not my purpose to enquire.

There are here, as elsewhere, some *latent* indispositions of the atmosphere, the sources of which we cannot easily trace. In Canada the sensible alterations in the air as to heat, cold, moisture, &c., do not influence in the same manner as in other cold countries in Europe—the colder parts of Great Britain, for instance—where the mortality is higher in cold than in warm weather—the reverse of what is observed here.* Beyond those sensible conditions, therefore, (heat, cold, moisture, ozonic or electrical state) there are other differences which it is not easy to explain without taking largely into consideration the relative social condition of the two peoples.

Cold.

In Canada the cold of winter is severe without being destructive. The sharp, clear, bracing cold is more easily and more agreeably borne than is the humid, raw air of March or October. The cold, during winter, seems to be more superficial, as it were, and to call into activity the capillaries of the surface of the body. The skin reddens, and there is an almost irresistible desire for exercise;—not as during the cold wet seasons of other climes, where the only movements to which one feels impelled are involuntary;—when people stand and shiver.

It might, at first thought, appear that the temperature of Canada, rendered low by its geographical position, would affect the human constitution much as in those countries

* In Glasgow, for instance, as winter approaches, it is not unusual to read, year after year, something like the following, which I transcribe:—"The severely cold and foggy weather which has set in has increased the mortality of the city, and unless a change in the temperature takes place soon, the death-rate will go up further."

where the temperature is rendered cold by their great altitude. But if Chateaubriand be an authority, it would seem to be quite otherwise; for the author of the "Genie du Christianisme" when speaking of Mont St. Bernard, says: "Un air trop vif use les ressorts de la respiration, et l'on y vit avec peine plus de dix ans. Ainsi le monde qui s'enferme dans l'hospice peut calculer à peu près le nombre des jours qu'il restera sur la terre; tout ce qu'il gagne c'est de connaitre le moment de sa mort, qui est inconnue au reste des humains!" But no such gloomy forebodings haunt the resident of Canada. The cold is, indeed, sufficiently exhilarating for comfort; but not for early destruction. It is not here as the Iliad had it—

> ". . . Numbing frost, which all the works
> Suspends of man and saddens all the flocks."

That the cold of winter is severe, without being destructive, I may state that northern voyageurs have been accustomed to pass many days in the open air in districts where the ice in the rivers was frozen to the very bottom; where the few stunted spruce or fir trees were insufficient to afford shelter; and where an upturned canoe, or sledge, or piece of canvass was made to do service in affording a screen behind which the men could sleep or take their morning or evening meal. To them it appeared incredible how people perish of cold in Great Britain. But the sky is clear; the air is dry; although the temperature, as registered by the thermometer, is low. A much higher temperature, charged with moisture, would quickly penetrate to the centre of circulation and of life.

But moisture in the air is inconsistent with extreme cold; for when the thermometer is low, it is observed that the lower strata are "suffused with icy particles, the offspring of intense congelation." When, however, the temperature is not so low as *at once* to congeal all the watery particles in the air, which, near the coast or larger lakes

or bays, are given off from the surface of the adjoining water, the superadded moisture adds to the discomfort in a ratio altogether disproportionate to the temperature.

The exhilirating influence of a Canadian winter is supposed to depend upon its peculiar electrical condition. That exhilirating influence is continued within certain limits so long as motion continues. In the last years of the "Rescue Party," forced travelling continued sometimes seventy to eighty hours almost without a halt, and with the thermometer—40° to—50° without a frost-bite, showing, as the narrator states, that a low temperature is no obstacle to travel.*

That the cold winters are not destructive or inimical to life, we may show by the hardships successfully surmounted by the Sisters of St. Joseph when founding the Hôtel-Dieu Hospital in Montreal two centuries and a half ago. During twenty-eight winters the walls of the building were a single slab or board in thickness, and so badly joined, says a writer, that when snow fell at night, their first duty in the morning was to remove it with shovels. They had not yet learned the use of underground cellars in preserving their food from the frost; and frozen food—a small lump of lard or salt fish—became their portion. A writer of that period, M. Morin says: "They were at least two years without seeing any fruits or vegetables, except almost inedible wild plums once or twice a year, as any attempt at gathering berries or fruits for the winter was attended with too great danger from the Iroquois."

It has been asserted that our sometimes intensely cold, dry air has a perceptible pungency upon respiration; but I have never noticed it, though I have often remarked a

*It is a singular fact, noted by those who have undergone long continued fatigue in a very low temperature, and one which physiologists may not easily harmonize with established theories, that persons are more prostrated by the repose and comfort that follow, than by the most severe and constant labour and exposure.

sensation of dryness in the air passages, especially in the nostrils, and a disinclination, at times, to take a deep inspiration.

The long continued action of severe cold is said to produce, in the end, feelings of a most pleasing kind:—first languor, and to languor succeeds drowsiness,—and an almost irresistible propensity to sleep, which, if indulged in, terminates painlessly and pleasantly in death. But, in truth, the sensation experienced when cold is severe, and when its long continuance is benumbing the senses, is not so much one of pleasant drowsiness, as is so often stated, as it is of an indisposition to motion, because motion is painful. Dr. Kane thus graphically and truly describes that condition: "Have you ever received the shocks of a magneto-electric machine, and had the peculiar benumbing sensation of 'Can't let go' extending up to your elbow joints? Deprive this of its paroxysmal character; subdue, but diffuse it over every part of the system, and you have the so-called pleasurable feelings of incipient freezing. It seems even to extend to your brain. Its inertia is augmented; everything about you seems of a ponderous sort; and the whole amount of pleasure is in gratifying the disposition to remain at rest, and spare yourself an encounter with these latent resistances."

The countenances of those frozen to death are singularly calm and placid, and not indicative of any suffering. There is a smile which has led the untutored Indian to believe that the frozen one had obtained—ere the vital spark had fled—a foretaste of those hunting grounds for which his heart yearns when in life; and that Gitche Manitou, the Mighty, had displayed before his vision bows and arrows, and rich furs of ermine—whiter than the snow already enshrouding him.* Those who have been aroused

* In February, 1646, when Père de Nouë was discovered frozen to death between Sorel and St. Ours, by the two Hurons and a French soldier sent out to search for him, his snowshoes were laid aside, his hat was

from the lethargy which precedes death, describe that state as one exquisitely free from pain or suffering or anxiety, when remaining motionless; but the awakening from it as a torture and a cruelty.

It may be asked: what degree of cold, and what continuance of it may be borne without experiencing that lethargy which steals over one's senses, and lulls to fatal sleep? To this it may be answered that not so much the temperature, as the agitation of the air; not so much the agitation of the air as the *moisture* it contains; and not so much agitation, or moisture, or both, as the condition of the body at the time, and its power of generating and retaining heat. A temperature scarcely below freezing may be fatal to some. Yet, far north of us, persons have slept comfortably in a snowdrift when the thermometer was fifty-four degrees below zero! Voyageurs, on whose testimony we can rely, state they have slept in canvas-tents, without discomfort, yet without fire, at—52°. "The marvel is," says one of them, "how life sustains itself in such circumstances of cold." When, however, the cold is severe and long-continued, and when persons are not inured, there is often experienced a dull, heavy pain between the eyes, and extending a short distance up the forehead. This begins near, possibly in, the frontal sinus, and extends upwards; and may be compared to what is described in medical language as gravedo.

The sudden occurrence of cold is unlike the sudden occurrence of heat—the latter enervates and depresses—the former, though it pinches, invigorates and disposes to activity; and this disposition to activity has a certain

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placed on a bank of snow near him, and he was upon his knees, with his arms folded across his breast in an attitude of prayer, his eyes open and looking upwards, and a *smile* on his rigidly frozen face. His features looked so pleasantly calm that both soldier and savages knelt respectfully at a distance in silence, till the continued stillness and immobility convinced them of his death.

relation to the dryness of the atmosphere and to its electrical condition. As the invitation to muscular energy is irresistible, feeding is necessarily heavy.

It has been observed that when the temperature rises from −30° or −40°, or lower, to zero or + 10° or + 20°, a close oppressive sensation is experienced—not, as might be supposed, from disturbance of the respiratory organs—but from some cardiac derangement, the precise pathology and nature of which it would be needless to explain.

The sensations of cold we experience in winter are but relative. When the body is inured to severe cold, a moderate degree of elevation is easily felt. After several days of severe cold, if the thermometer rises considerably, a feeling of lassitude is experienced; and what was uncomfortably cold when the thermometer was falling, becomes oppressively warm when the same temperature is reached in ascending. We shiver when zero is reached in descending the scale; but we find the same degree of cold, spring-like, when that temperature has been reached after living in a much lower one. Arctic travellers, revelling in a temperature −20° or −25° experience a positive sensation of warmth when zero is reached —a temperature which enables them to walk about "with bare hands and sweating body."

The effects of long continued cold have been supposed, but without reason, to produce an unfavorable influence upon the nervous functions. "Quand les effets du froid," say l'Abbé Richard, "ne se portent pas au dehors d'une manière aussi sensible, ils n'agissent pas avec moins de violence sur l'intérieur de la machine; sur les esprits animaux; sur le fluide vital resserré dans les vaisseaux qu'il arrose et qu'il vivifie au point de changer entièrement le tempérament habituel et le caractère de certaines personnes." "Le grand froid," says M. Dubois, "glace l'imagination d'une infinité de personnes."*

* That severe cold does not produce such serious, baneful results, it may be stated that Lord Dufferin found the inhabitants of Iceland "endowed

That the severest cold does not produce those benumbing influences spoken of, Dr. Kane writes that "the Esquimaux are a happy race of people, happy so far as content and an elastic temperament go to make up happiness."

The frigid influence of cold upon the older inhabitants of this country has not yet become apparent, if we judge from the French Canadian peasantry. Imagination with them is not yet frozen; and we see none of that change of humour, from agreeable and gentle to the ferocious so graphically alluded to. On the contrary, though they feel the icy breath of winter,

> "Still they do not cease their singing,
> Still they do not leave their laughter;
> Only turn the log a little,
> Only make the fire burn brighter,
> Make the sparks fly up the smoke flue."

And the crackling fire, and the singing, and the laughter, banish gloom; and all is pleasanter because of a more vigorous, a more active enjoyment than if they lived in the land of dreamy, drowsy, never-ending summer.

The difference in temperature met with in the extreme north of Canada is far greater than in the hottest climate. When the temperature of India is reached, scarcely thirty degrees are traversed for the residents of western Europe; while in Canada, to reach the extremes, the oscillation is through a cycloid immensely greater. Yet, as Hayes observes, "the mysterious compensation by which we adapt ourselves to climate are more striking than in the tropics. In the Polar Zone the assault is immediate and sudden; and unlike the insidious fatality of hot countries, the results are produced rapidly."

It is remarkable how soon Europeans inure themselves

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with an amount of intellectual energy hardly to be expected in so secluded a community—the Icelandic settlers devoting the long leisure of their winter nights to intellectual occupations, became the first of any European nation to create for themselves a native literature."

to severe cold. The temperature of the ultra-Arctic climate did not affect the health of those hardy explorers who wintered along the northern coast as high as lat. 8° 3′ 10″, long. 70° 40′, where the thermometer ranged during many weeks as low as −60° F.—a much greater degree of cold than one is likely to be called upon to endure, even for a few hours, in the most northern parts of Canada. How often have *voyageurs*, in the extreme north, been obliged to pass the night without fire in a temperature −54°.

But shelter from the wind in extremely cold weather is attended with a comfort that elevation of temperature within certain limits does not confer. *Voyageurs* have walked in comfort from Hudson's Bay to Red River, and thence to Athabasca, with a single woollen *capot*, sleeping in the same without extra covering; but on approaching the unsheltered precincts of the Polar circle, even though the thermometer indicated a higher temperature, the hairy reindeer coats and reindeer covering at night, and the dogs crouching around, were insufficient to prevent serious discomfort and suffering.

In the Relations des Jesuites, published by Government —a work, the huge size of which alone deters many from reading, yet which contains all that relates to the early settlement of the country—the writer, speaking of cold in winter, says: "Tender and delicate girls who fear a snowflake in France are not astonished to find mountains of it here. A slight frost caused them to take cold in their well-closed houses; and now, a huge great and very long winter, armed from head to foot with snow and ice, produces, apparently, no other effect than to keep them in good appetite."*

It may not be generally known that many *habitants* are in the habit of allowing their horses to gather their food around hay stacks; or to browse, as best they may, on the

* See also Voyage autour de l'Ile d'Orleans, p. 168.

sappy twigs of young or fallen trees. The animals, thus exposed to a temperature sometimes thirty or more degrees below zero, seem to enjoy good health. At any rate they survive, and are very hardy and serviceable animals. Some young animals are not housed during the whole winter; and have neither hay nor oats given them till they are of age to work. In no other country could animals, so ill furnished as is the horse, withstand so low a temperature. But, as I have more than once said, the air is stimulating to capillary circulation; and though the cold drives the blood from the surface and constringes the capillaries, it quickly calls it back again through capillaries dilated to receive it in greater abundance.*

The relative

MORTALITY

of any given country may, to a certain extent, be gathered from its weekly or monthly returns. In Canada, were we to pin our faith to such documents, we should be led very far astray. There is here no uniform system of registration. The guardians of the different cemeteries in or near the larger cities keep, 'tis true, the records of deaths; but if a physician were to inspect them, he would be puzzled at the strange diseases which sometimes carry off the natives, and for the description of which he might search in his books in vain. As statistics are valuable only in proportion to their accuracy, I feel it necessary to ignore those ex-graveyard records of names and diseases furnished by surviving friends; and I do so with regret, as I have little that is more reliable in their places. And here I may venture to express the hope that, ere many sessions shall have been brought to a close, there may be some uniform system of medical registration

* It is marvellous that surgeons should, until lately, have perpetrated and perpetuated the mistake of using cold as a hœmostatic in hæmorrhage, when its application increases, not diminihses, the flow of blood to the part so treated through the dilated capillaries.

for all the provinces of the Dominion. I shall confine myself, therefore, to returns furnished by the surgeons and assistant-surgeons of the American and British armies at the different stations.

There is, as may be supposed from its extent, a difference between the ratio of mortality at different places in this vast Dominion. For convenienee of description, as well as for other purposes, Canada may be divided into three portions: 1st. That portion east of the great lakes; 2nd. The lake region; 3rd. The large tract of country north-west of the great lakes.

At Fort Sullivan, Maine, on the Atlantic coast—which may be taken as an index for those parts of the Eastern province bordering on the coast, the ratio of deaths among the American troops is $2\frac{1}{2}$ in 100. In the lake region, it sinks to less than one per 100; and in the regions north of the lakes, it sinks again to $\frac{8}{10}$ or $\frac{3}{10}$ less than one per 100.

If we compare the northern division with the more southerly divisions of the United States, the comparison is most favorable to the former, and by *ricochet* to Canada.

In the southern division, according to the same returns, the average deaths per 1,000 annually rise to 22 or 23 per mill. (The Adjutant-General's returns are still higher.) Fort Snelling, west of Lake Superior, lat. 44° 53 N. long. 93°1 W., has generally been taken as typical of the western region, and the records show the annual ratio of mortality, exclusive of accidents, to be less than $\frac{5}{10}$ per mill, or one-half of one per cent. The following is a classification of the diseases:—Diseases of the digestive organs, 529; of the nervous system, 31; of the respiratory system, 985; and of those 985, only *four* are consumptive. We may cast our eyes over the whole habitable world and they cannot rest upon any spot freer from that fell destroyer of the human race than is this region.

The relative healthiness of the different stations may be perceived from the following :—

TABLE EXHIBITING THE ANNUAL RESULTS AND MORTALITY OF DISEASES.

Northern Division.	Mean Strength.	Ratio of cases per 1,000 of mean strength.					Deaths.						
		Catarrh and influenza.	Pneumonia.	Pleuritis.	Phthisis pulmonalis.	Total.	Catarrh and influenza.	Pneumonia.	Pleuritis.	Phthisis pulmonalis.	Hœmoptysis.	Total per medical returns	Cause not specified.
Posts on Lakes..	5973	300	19	30	9	358	1	4	..	9	..	65	12
Atlantic Posts...	3130	233	22	26	9	290	....	1	..	15	..	140	16
Posts remote fr'm the ocean and Lak'es.	12604	552	17	28	5	602	....	3	1	22	1	119	16
Total.....	21707	439	18	28	7	490	1	8	1	46	1	324	44

TABLE EXHIBITING THE RELATIVE MORTALITY, EXTENT OF SICKNESS, AND COMPARATIVE PREVALENCE OF CERTAIN DISEASES.

Systems of climate.	Deaths per centum per medical returns.	Deaths per centum per adjutant general's returns.	Ratio per 1,000 of mean strength, under treatment annually.	Ratio of cases per 1,000 of mean strength.								
				Intermittent fever.	Remittent fever.	Synochal fever.	Typhus fever.	Diarrhœa and Dysentery.	Respiratory Organs.			
									Catarrh & Influenza.	Pneumonia.	Pleuritis.	Phthis. pulm'alis.	Total.
NorthernLakes	9.10	13.10	21.85	193	33	16	4.	253	300	19	30	9	358
Atlantic Coast.	15.10	2.	19.12	36	26	43	5.	170	233	22	26	9	290
Stations remote from Ocean & Inland Seas..	8.10	14.10	31.03	151	24	45	59.10	300	552	17	28	5	602
Average.....	9.10	15.10	26.60	143	26	37	24.10	269	439	18	28	7	490
Average.....	11.10	16.10	24.00	217	28	35	33.10	243	362	19	28	8	412

It is only necessary to add that on the Atlantic coast, where the mortality is 50 per cent. higher than the mean of the other two classes, Dr. Forry ascribes the result mainly to the circumstance that "the masses have more easy access to spirituous liquors." The direct effects of the abuse of intoxicating draughts are established in every page of the statistics. The mortality, even from lung affections, was chiefly owing to that cause.

The relative salubrity of different stations is evident from the following table of mortality:—

Florida, extreme south of North America, and favorite land of consumptives	$7\frac{6}{10}$
Leavenworth, on the Missouri	$5\frac{7}{10}$
Forts Washington, Monroe and Johnston	$4\frac{7}{10}$
Forts Armstrong and Jefferson (junction of Mississippi and Missouri)	$3\frac{6}{10}$
Forts Columbus and McHenry (north of above)	$3\frac{4}{10}$
Forts Snelling, Crawford and Winnibago (east of above)	$2\frac{8}{10}$
Fort Brady, foot of Lake Superior; and Mackinac, head of Lake Huron	$2\frac{8}{10}$

From the above table it appears that stations improve in salubrity in direct ratio to their proximity to the Canadian frontier, and the great chain of Canadian lakes. When these are reached there is, so far as I know, no influence, telluric or climatic, to interfere with the continued favorable progression northward.

The following figures exhibit more fully what was stated in a previous page, being a:—

TABLE EXHIBITING A GENERAL VIEW OF DISEASES IN THE NORTHERN AND SOUTHERN DIVISIONS.

Specific diseases.	Northern division.			Southern division.		
	Total of cases treated.	Total deaths.	Proportion of deaths to the number treated.	Total of cases treated.	Total deaths.	Proportion of deaths to the number treated.
Feb. Intermittens..	3.187	1	1 in. 3.187	14.094	13	1 in. 1.084
" Remittens....	587	12	1 in. 49	4.196	145	1 in. 29
" Synochus.....	825	2	1 in. 412	718	11	1 in. 65
" Typhus	54	8	1 in. 7	100	24	1 in. 5
Catarrh & Influenza.	9.538	1	1 in. 9.538	7.471	4	1 in. 1.868
Pneumonia.	610	8	1 in. 76	900	42	1 in. 21
Pleuritis.....	652	1	1 in. 652	1.060	6	1 in. 177
Phthisis pulmonalis.	152	46	1 in. 33-10	257	116	1 in. 2
Hœmoptysis.	83	1	1 in. 83	84	2	1 in. 42
Dysenteria..... } Diarrhœa. ..... }	5.981	4 } 5 }	1 in. 665	13.135	38 } 53 }	1 in. 141
Gastritis & Enteritis	289	1	1 in. 289	633	26	1 in. 24
Cholic and Cholera.	3.221	2	1 in. 1.610	3.282	7	1 in. 496
Epidemic Cholera...	302	103	1 in. 3	384	88	1 in. 43-10
Hepatitis acuta et chron	98	3	1 in. 33	166	4	1 in. 41
Phrenitis & Meningitis.....	18	3	1 in. 6	31	5	1 in. 6
Apoplexia.....	6	4	1 in. 15-10	25	1	1 in. 25-10
Epilepsia.	166	5	1 in. 33	188	9	1 in. 21
Mania a potu.....	102	3	1 in. 34	306	39	1 in. 8
Ebrietas	1.370	5	1 in. 274	2.616	58	1 in. 45
Nyctalopia.....	18	.....	0 in. 18	191	.....	0 in. 191
Rheumatismus.....	3.412	.....	0 in. 3.412	2.845	1	1 in. 2.845
Gonorrhœa.	971	.....	0 in. 971	929	.....	0 in. 929
Syphilis.....	462	1	1 in. 462	584	.....	0 in. 584
Hydrops.....	50	4	1 in. 12	206	19	1 in. 11
Atrophia and Chronic visceral lesions	.....	9	.....	.....	16	.....
Casualties.	.....	35	....	.....	50	.....
Suddenly.	.....	3	.....	.....	7	.....
All other diseases..	.....	11	....	.....	28	.....
Total.....	32.154	281	1 in. 144	54.411	833	1 in. 75

From this it will be seen that in the regions far removed from large bodies of water; where great extremes of temperature prevail—as in the Red River district; where there is little or no spring; where the transition from the cold of winter to the heat of summer is sudden, and often severe; where the general range of the thermometer is from 70° to 80° above, in summer, to 30° and 40° below zero in winter; and where the thermometer often registers 90° in the shade, the annual ratio of mortality is little more than *one* per cent. And were it not for the vice of intemperance, which leads to the exposure of it's victims' limbs in winter, and to night air at all seasons, the ratio of mortality would be still very much less.

I have now to adduce a table of the relative salubrity of the different head *stations of the British army* to complete my neecessarily meagre statistical notices. The healthiest station of the British army is Malta and the least healthy Bengal; but the British American stations occupy a high place in the scale. In salubrity Nova Scotia, New Brunswick, Quebec, Ontario, are all healthier than Great Britain. The deaths at different stations are thus given:—

Malta	1 1/10	Bermudas	2 9/10
Nova Scotia	1 4/10	Bombay	3 3/10
Canada (Quebec and Ontario)	1 5/10	Mauritius	3 5/10
Great Britain	1 7/10	Newfoundland	3 8/10
Cape of Good Hope	1 8/10	Ceylon	4 8/10
Gibraltar	2 1/10	Bengal	5 5/10
Ionian Islands	2 4/10		

These figures exhibit Canada in a most favorable light; and were it not for intemperance—that active cause of disease and death amongst the troops—the bills of mortality would be much lower. Nor let it be supposed that intem-

perance was as rife among the troops in Great Britain as in Canada; for the price of whiskey is here so very low, and the fusel it contains so very large, that a soldier requires to finance but little to obtain, for a few pence, a sufficient quantity to make him "o'er all the ills of life victorious." The authorities are ever struggling against this excess in the use of ardent spirits; but the soldier's money is his own, and opportunities are not wanting to dispose of it to his gratification and injury. In the American army, affairs, as I have said, are infinitely worse, and of the total number of deaths, nine out of every twenty-three are traced *directly* to an excessive use of ardent spirits; whilst others, doubtless, are owing to the same cause. Representations have been made to the Secretary of War as to the importance of striking the whiskey altogether from the rations, and of substituting an equivalent in vegetables.

I shall not fatigue you by enumerating all the diseases which are less or more frequently met with in Canada than elsewhere. Malarious fevers and consumption, however, cannot be omitted.

Intermittent Fever.

The disease called fever and ague, you all know, results from the exposure of the body to, or the inhalation of, the miasmata of marshy districts. Some years ago, it was a disease common to all those who settled on that tract of land separating Lakes Huron and Erie, the St. Clair Flats and neighbourhood. Toronto, Kingston, and other western cities were subject to it, but it is rarely met with so far north as Montreal, and unless imported from the west, is almost unknown in eastern Canada.

Sometimes the dividing line between a malarial and a non-malarial district is well-defined, and the distances between these districts are inconsiderable often.*

* Dr. Gardner, of London, Ont., informs me that north of that city people have a healthy, vigorous appearance; and that twenty miles south of it—that is, within the malarial belt—they are less healthy, and assume a malarial aspect.

Travellers passing through the infected parts of the province during the day time run no risk whatever of being seized with the disease; but to one not acclimatized, to sleep over night in the infected district, and especially on a low level, is to expose oneself to the risk of having the *tertian* with her chilling winds to overshadow him. These are facts which have been observed on a large scale in the United States and in western Canada. During the summer of 1864-65, the male wards in the hospital to which I am attached, received many soldiers, returning invalided from intermittent fever from the scenes of carnage. In every instance the disease was traced to sleeping at night on the ground, with a blanket or branches interposed—and sometimes without either. Headache; heat of skin; pain in the back and limbs; cough and then a chill, followed by heat and sweating, were wont to follow each other in the order named.

But the climate of western Canada has greatly improved in this respect within the past few years, and Limnorea, npmph of marshes, will soon find her occupation gone. Not more than twenty years ago, a drug house in one of the western cities of Canada sold 15,000 ounces of quinine annually. Now, I am informed, the same house, with a constantly increasing business, does not dispose of a tenth part of that quantity in the same period. As quinine is the remedy usually taken in intermittent fever, this fact alone shows how much the climate has improved in that respect. The axe and the brush-hook; fire and the plough, and drainage have done the labour assigned to Hiawatha, who, as we are told—

> Has slain the Great Pearl Feather,
> Slain the mightiest of magicians:
> Him, who sent the fiery fever—
> Sent the white fog from the fenlands.

Apart altogether from intermittent fever, which is met with in many parts of western Canada, but not in so

severe a form as in the western United States—and is unknown, except by importation, in eastern Canada—both eastern and western Canada are really more salubrious.

Intermittent fever is now less common in Canada than it was in England a hundred years ago. Dr. Lind, writing, at the time, of the manner of treating the diseases peculiar to different countries, says: "I cannot dismiss the subject without offering a few thoughts on *Agues*, the endemical disease of marshy situations in England."

Remittent Fever is frequently met with in different parts of Canada, but is of a very mild type. It increases in frequency as we travel southwards. In the Southern States one in every twenty-nine is affected with it—whereas only one in forty-nine becomes the subject of it in the North. The virulence of the disease, moreover, increases more rapidly than its frequency as we proceed southwards, as the following table will show:—

Deaths from	remittent fever	in	south. div. of U. S.	60	p. 10,000
"	"	"	north. " "	5	p. 10,000
"	"	"	Canada.....	3	p. 10,000

In many parts of the lower provinces of Canada the disease is unknown.

"*Bilious Remittent*," the endemic of the paludal districts of all hot climates, which, according to Dr. Condie is, with the exception of the intermittent, the most common form of fever prevalent in the middle, southern, and south-western sections of the United States, is here almost unknown. There is a mild form of fever met with in Canada which some call "Gastric fever;" others "Spring fever," and others, less informed, call "Bilious Remittent;" but it has few of the characters which entitle it to so important an appellation. It is an exceedingly mild form of fever, having slight remissions, and may be called "Spring" or "Autumnal" fever, according to the season at which it occurs. It is some-

times met with in isolated cases; is neither epidemic nor endemic, but sometimes sporadic—that is, accidentally as it were, and independently of any epidemic influence. It is neither infectious nor contagious; requires a period of from ten to eighteen days for its cure; and it never leaves those formidable sequels we sometimes see to follow intermittent fever.

Ephemera.

Besides the above fevers, there is another form of fever of a still milder type: a "day" fever—Ephemera of the ancient Greeks—which has nought to do with the county in which it occurs; but which may arise anywhere, from drunkenness, exposure, etc., and is characterized by an increased velocity in the circulation, without any local disturbance further than that caused by one or more organs accidentally participating in the general disturbance. There is a general indisposition, with vomiting, increased heat, thirst, quickened pulse, etc. Like the preceding, it more commonly makes its appearance in spring or autumn, and it also receives its designation from the season in which it occurs.

Indeed the fevers of Canada, even those of local or zymotic origin, are so rare and so mild, that to allow a little for poetic license, we might say of them, with the brave Basil, they can be cured

"By wearing a spider hung round one's neck in a nut-shell."

Hitherto I have confined my remarks to old Canada proper, though they are, and in the sequel will be, applicable to the whole Dominion. Bouchette and McGregor say there is a full share of general salubrity and freedom from pestilential diseases in Prince Edward Island. Nova Scotia and New Brunswick enjoy a like immunity.

Among the other diseases to which I wish specially to direct attention is *Consumption*—a disease prevalent and

fatal in almost every clime; and in almost every nation; and amongst every age, class and condition. And I do so for the purpose of correcting an erroneous impression relative to the comparative effects of warm and cold climates upon the disease—an impression, acting on which, some members of my own profession not unfrequently consign many to premature death. We hear of consumptive patients being sent southward every autumn to avoid the cold of our Canadian winter. Fatal mistake! The cold, clear, dry, bracing, stimulating air of winter affords them the best—sometimes perhaps the only—chance of recovery.

In this connection I cannot refrain from quoting at some length, and with entire approval, the remarks of the compiler of the report on the sickness and mortality in the army of the United States. FIRST: That temperature, considered by itself, does not exert that marked controlling influence upon the development or progress of phthisis which has been attributed to it. SECOND: That the most important atmospherical condition for a consumptive is DRYNESS. But the "total annual precipitation in rain and snow may be equal in two or more places, and yet the average condition of the air, as respects moisture—the dew-point—may widely differ." THIRD: That next to DRYNESS in importance is an EQUABLE temperature—a temperature uniform for long periods, and not disturbed by sudden or frequent change. An uniformly *low* temperature is much to be preferred to an uniformly *high* temperature. The former exerts a tonic and stimulating effect upon the general system; while the latter produces general debility and nervous exhaustion. The worst possible climate for a consumptive is one with long continued high temperature, and a high dew-point." These remarks of the reporter on the "sickness and mortality in the army of the United States" are of especial value as they are based on a careful examination of the consolidated temperature, rain, and weather tables, in connexion with the statistics relative to consumption.

To persons laboring under Chronic Bronchitis, or Pleurisy, a winter residence in a southern latitude may be advisable. But for other chest affections, and particularly consumption, the cold air of the north is to be preferred. Every physician now listening to me can recall to his mind phthisical cases which have been greatly benefitted by transplantation to this country to pass the winter season. Consumptives tell us their breathing is easier; and it may be stated, with a great degree of certainty, that whatever contributes to the patient's comfort; whatever enables him to breathe more freely, has a beneficial influence on the disease. Vital statistics, moreover, are favorable to northern climates in this respect. I have already introduced tables from army returns to show the relative healthiness of the hot and cold regions of the United States in this regard —and you will bear in mind that of the cases treated in the northern division, 1 in $3\frac{3}{10}$ died; while in the southern division the cases were more numerous and more fatal, deaths, being 1 in 2.

Bleeding from the lungs is twice as fatal in the southern division as it is in the northern: 1 in 83 in the latter—1 in 42 in the former.

Diarrhœa and dysentery, so distressing at all times, but particularly so to the consumptive, are nearly three times as prevalent in the southern division as in the northern; and $4\frac{1}{2}$ times as fatal. The figures are: in the north, 5981-9 cases; deaths, 1 in 665; in the south, 13,135 cases; deaths, 1 in 141! Will not a contemplation of these facts deter the consumptive running amuck with the enervating south winds, where he is sure to be worsted?

From a civil source I obtain figures equally conclusive:

	Northern Regions, U.S.	Southern Regions, U.S.
Consumption	$2\frac{1}{10}$	$4\frac{4}{10}$
Pneumonia, Pleuritis and Catarrh	$0\frac{4}{10}$	$1\frac{8}{10}$

These statistics are all from reliable American sources,

and go far to supply information which our own country does not yet so well furnish.

The statistics of the British army are equally satisfactory. The table compiled from the statistical reports on the sickness, mortality and invaliding, places Canada above Malta and Bermuda with reference to consumption. Malta has a ratio of cases per 1,000 of mean strength 6.0, Bermuda has 8.9, and Canada 5.6.

Those diseases which occur independently of all cognizable external influences are met with here, as elsewhere. The different forms of cancer run their fatal course in the same way; at about the same rate; and, if removed, with about the same chances of recurrence. Affections of the skin are much less frequent; cataract, judging from my former experience, is more common; inflammation of the respiratory organs is rare; but inflammation of their investing membranes—particularly of the pleura—is more common.

Those diseases which are reproduced, as it were, in the bodies of the sick, and are, in that way, propagated, are, during winter,—especially among the humbler classes, where fuel is saved at the expense of ventilation,—more common in Canada than in Europe. Measles, whooping-cough, and small-pox are common; the latter, in its confluent form, carries off many a victim. Amongst the French-Canadian population, one or more members in almost every family exhibits traces of its former presence; while the aborigines and half-breeds have, at different times, suffered severely from its ravages.

Scrofulous diseases, generally so prevalent in countries with a moist and damp atmosphere, such as that of Great Britain,* parts of Germany and France, are less frequently

* The late Dr. Gregory, of Edinburgh, used to say that there was not a single family in Scotland free from scrofula. Dr. John Thompson says "that it is rare to meet with an individual who has not, at some period of life, experienced disease in some shape or other belonging to one of the several forms of scrofula."

observed in Canada. Scrofulous diseases of the joints—and especially of the wrists, ankles, knees and spine—which are seen in such numbers in all parts of Europe, and especially of Great Britain, are here comparatively rare.

Inflammations of the eye, which, in consequence of rapid changes of temperature and imprudent exposure, are frequent, are not generally of a scrofulous type—different indeed from the state of matters in Europe.* Here, on the other hand, these affections, except in the extremely ill-fed, ill-clothed and ill-housed, are infrequent.

This portion of the continent, as compared with Europe, is remarkably free from blindness. In Great Britain there is 1 blind in 1,230; in France, 1 in 938; in Norway, 1 in 540; in Canada, 1 in 2,470. One of the most common causes of blindness among the people in Europe is scrofulous inflammation; here it is rarely a cause. Blindness in Canada is most commonly caused by small-pox in the young; cataract in the middle-aged and old; and by mechanical injury at all ages. Sun blindness is not uncommon; but is included in the figures given.

In the whole of Canada the proportion of insane is 1 to 720. In western Canada it is somewhat more than in eastern Canada, being 1 in 714. The number of insane males is considerably greater than that of females: 5,026 of the former being recorded to 4,397 of the latter. Is insanity on the increase here, as in the United States, where, according to Dr. Clarke, it undoubtedly is? In the decade of 1870 to 1880 the population in the adjoining union increased 30 per cent.; while, according to the same authority, the insane increased at a ratio of 146 per cent! How much of this large percentage is due to the

* Beer states that 9-10ths of the opthalmic inflammations in children at Vienna are strumous, and that there are few families in Vienna in which some of the children do not exhibit scrofulous disease. Benedict says in Breslau the proportion is 95 in 100.

continued excitement of the people and the ceaseless race for wealth which has had, perhaps, no parallel since the Golden Calf was worshipped as a god.

The number of deaf-mutes is 3,789—not a large ratio to the number of inhabitants.

Every climate has its *peculiar diseases*, says a writer; but Canada is, in a most remarkable degree, exempt from those disorders which are indigenous to different parts of Europe. Those diseases which are peculiar to certain climates; and to certain localities; and to certain grades of society are here almost unknown. Rickets, so common in England as to have obtained for it the name of 'Englische Krankheit;' Goitre, so common in the valleys of the Rhone; and Cretinism, indicative of the degeneracy of the human species; exhibiting itself in deformed heads, short bodies, thick necks and imbecility, are not met with here as in like climates in the north of Europe. Pellagra, that terrible disease of the skin, preceded by hypochondriasm, lassitude and melancholy; and those numerous disorders which are met with in Oriental climes, are here unknown in our hot seasons.

An exception would seem to present itself to an almost insignificant extent in the disease termed Leprosy, which bears much resemblance to Elephantiasis of the Grecks, met with, in sporadic form, and to a very limited extent, on the Miramichi river in New Brunswick. But that loathsome malady is not indigenous. It had not its origin here, for tradition has it that more than a hundred years ago a French ship was wrecked on the coast, and those who escaped were sailors from Marseilles, who, in return for the hospitality they received from a poor woman who washed their clothing, sowed the seeds of a loathsome disease which is now confined to the Lazaretto at Tracadie, on the New Brunswick coast, and where the inmates are destined to a life of hopeless misery. Not hopeless misery now, however, as Governor Gordon had

it, when he wrote, for at the present time the Hôtel-Dieu Sisters of Montreal have assumed charge of the Lazaretto, and there, now, reign cleanliness, where oncewas filth; comfort, where once was misery; and cheerfulness, where once was hideous despair and melancholy. The disease will soon die out, for those lepers are cut off from all communication with the healthy, by a perpetual quarantine, from which death alone can free them. The disease is supposed by many to be of a syphilitic nature.

I know not where else, and when, a writer in the "Dictionnaire des Sciences Medicales," 27th volume, would place Leprosy in the following, though he gives a wide field to choose from: "Parcourez Amerique et vous verrez que la lèpre s'y multiplie d'une manière effrayante; parmi les maladies du Greenland, elle tient un des premiers rangs; *le Canada*, la *Nouvelle Ecosse*, donnent naissance à l'elephantiasis des jambes." I know no part of Canada (now Ontario and Quebec) and no part of Nova Scotia where Leprosy exists in that form termed Elephantiasis—even when limited to the legs—and certainly no place where the disease is "multiplying itself in a frightful manner." The disease must have occurred *after* the report to the Conseil Souverain was made in 1668—where there is no mention of this disease—while others, less important, are noticed; and *before* the advent of physicians of the present day, of the best informed of whom I have made enquiries concerning the actual or past presence of this pitiable scourge, but with uniformly negative results.

With regard to those diseases which are met with in different parts of the world—inflammations and other diseases of the various organs of the body—there is little in the shape of difference to record. Great Britain and France, the countries whence, chiefly, Canadians are sprung, furnish analogies sufficiently close for our purpose.

It might be expected I should allude to that very rare cause of death, sun-stroke (*coup de soleil*),—which sometimes occurs in the months of July and August—a disease, or rather accident, which takes place, under peculiar meteorological conditions when the sky becomes partially obscured by negatively electrified clouds; and when the atmosphere is in that condition in which man's vital and mental energies are prostrated. The thermometer may not be necessarily high; yet a sense of oppression weighs him down; and it is during this period, after excessive fatigue, or severe labour in the heat of the day, particularly after a debauch, that persons have fallen victims to this terribly rapid and fatal malady. But many summers may pass without a single fatal case of sunstroke being recorded. The disease is less common here than in other countries where a like temperature obtains—in India for instance—where it is not only frequent but fatal—as the following statement in the Director General's returns would shew:—"Here are twenty-one admissions into the hospital in one season and twenty-one deaths."* Physicians in extensive practice are sometimes several seasons without seeing a case.

There is an affection to which at least the French-Canadian portion of the population of Canada is a stranger: hysterical affections; as M. de Gaspé says: "N'etaient guère connues des anciens Canadiens." I might also add: "des Canadiens de nos jours."

Indeed, in considering the few diseases which here afflict humanity relatively to elsewhere, we have great reason to be thankful to the All-powerful Controller of the seasons as of our fate, that in separating us from the great branch of the European family; and in

*Sunstroke was not unknown to the ancients. We read: "And Manasses was her husband of her tribe and kindred, who died in the barley-harvest. For, as he stood overseeing them, and bound sheaves in the field, the heat came upon his head and he fell on his bed, and died in the city of Bethulia."

placing us where there are indeed no majestic ruins scattered around to prove past greatness or add to present interest, He has prepared for us a land where we may not only live in peace with all men, but in the assurance that no noxious exhalation will imprint its morbid impress on our countenances—that no pestilential effluvia will enter our nostrils—that no serpent will instil its fatal poison into our veins—that with our breath we will draw no plague into our blood—and that, though He exposes us to much heat in summer and to a temperature in winter which pinches us till we cry out with Jacques: "this is no flattery," yet, through our intelligence, He keeps us in health, comfort and safety. More than once, during my professional career, I have endeavoured to map out one single disease, or form of disease, which we might claim as peculiarly our own;* but so far I cannot boast of having made the discovery, unless one, which is certainly not met with in Great Britain—the "Mal de Raquette,"† be termed

* While this is passing through the press I come across, in the course of reading, a description of a rather formidable disease, termed by Mons. Sourdan, *Mal de Chicot.* He says this name is given, in many places in Canada, to a disease which was developed here about 1778. His description is a lengthy one, and quite unsuited to these pages. It may be found in volume xxx. of the "Dictionaire des Sciences Medicales." It is spoken of as a disease which makes frightful progress—spares no one—but beginning in the mouth, lips or tongue, extends all over the body, causing ulcers, attacking the bones, &c. It attacks everybody, but chiefly children; but is amenable to treatment, and the treatment is given It is claimed: "Les habitans du Canada pretendant que ce sont les Anglais qui le leur ont apporté." The Canada Medical Association was in session at the time (August 1884), and I put the question to its members—medical gentlemen from every part of the Dominion—whether they knew the disease or anything akin to it by that name or by the description. The answer was in the negative. I may fairly conclude, therefore, that the writer of the article in question had been made the victim of a traveller's *canard.*

† Mal de Raquette is a painful affection of the flexor muscles of the legs, and sometimes of the flexors of the thighs, and arises from the violent use of particular muscles in those regions in snowshoeing. It is often accompanied by inflammation of the over-wrought muscle; and even suppuration may take place—but very rarely—along the painful track.

a disease. The early colonists had the same difficulty evidently, when they thus sum up the following short list of diseases most frequently met with in this country :—*Ecrouelles ; vers, le mal le plus ordinaire—un enfant en a été mangé tout en vie ! ! Cours de ventre ; rhumatismes ; gouttes froides ; Besoin de Chirurgiens speciaux, dans les Hospitaux ; descentes des Boyaux.* This may be found in the Registre du Conseil Souverain, 10 avril, 1658, and in a communication from Quebec to " L'Acadamie " (see de Bougainville) the diseases of the country are thus summed up : *Vers ; Convulsions ; gouttes-froides ; Ecrouelles chez les Sauvages ; Manque de Chirurgiens pour remettre les membres disloqués.*

This was the summing up of careful, painstaking observers, who seemed to note everything of moment and much of little interest, if anything relating to a strange country can be wanting in interest.

So healthy is the climate to those who live simply, that Père Charlevoix, a century and a half ago, spoke of it in his letters, in these words : " Nous ne connaissons point au monde de climat plus sain que celui-ci ; il n'y régne aucune maladie particulière ; les campagnes et les bois sont remplis de simples merveilleux ; et les arbres y distillent des baumes d'une grande vertu." A century and a half later, notwithstanding the artificial state of society which rapidly-gained riches had induced, in a manuscript published in France, the writer is so enthusiastic over the healthiness of this country that he energises in a very different style :—" Qu'ils viennent à bonne heure comme il leur plaira goûter la belle eau de nos rapides, et apprendre par leur propre expérience que la *seine* lui doit céder son nom, puisque celle-ci est mille fois plus avantageuse pour la *santé* du corps."

The ratio of mortality in places where physicians most do congregate, may, or may not be, influenced by their number : but their absence from certain localities may be a fair presumption of their not being required. Among

other places in Canada so blessed, if blessed it be, I may mention the Parish of Ste. Sophie de Halifax, County of Megantic, about nineteen leagues from Quebec, where there is not a physician in the whole parish of about three hundred families. I cannot say how many individuals there are: but when I add, they are all Canadian families, it is safe, I think, to conjecture that, to establish the number of individuals forming those three hundred families, the multiplier must be a respectable figure. The parish in question has not now, and never had, the luxury of a resident physician. Many places in Canada of almost equal extent are similarly circumstanced in this respect.

Mortality in Early Life.

That the children in Canada are born healthy the color of their chubby cheeks sufficiently attest. And that those indications of health bear witness to the good climatal conditions of the country is also evident. But the mortality in early life, here, as in Europe, is very high; and higher here than there. In 1854, there were born in England 634,405 children; of these 99,209 or 16.6 per cent. died under one year; and 278,185 or 28.8 per cent. under five years. Dr. Arch. Hall, at one time the accomplished editor of the *British American Journal of Medicine*, published in Montreal, stated that 62 per cent. of all the children born in Canada die under five years of age! Such an announcement, and from so respectable an authority, is well calculated to arrest our attention. And why this great mortality among infants of apparently healthy parents, born with all the outward signs of vigorous health? Were we to seek, in the dynamics of climate alone, the cause of this mortality, Canada might well be associated with the less salubrious. But I should be sorry, indeed, to attribute to climatal influences, the deaths arising from the imprudent exposure of the hands and feet and bodies of the children of the poor; from the excessive or improperly distributed cloth-

ing—equally injudicious—of the children of the rich; from the food in excessive quantity and of a too-stimulating quality which infants are supposed to require to "harden" their flesh; and from many other causes to which I shall have occasion to allude, when treating of the habits of society.

OLD AGE.

It might be supposed that the constant infraction of hygienic laws, begun in early life, would leave few to attain hale old age. Be that as it may, there are not wanting many—whose habits of life are simple and frugal—in whom we do not witness the premature display of the contracting influences of old age on their mental and physical condition. Old age is here a green, an active, a vigorous old age; and when the tree falls, as in time it must, it falls like the mature ash, which

"With all its tender foliage meets the ground."

The last scene of all which ends this strange, eventful history, is a quickly passing one. There are at present, or there was reputed to be, in Canada, at the taking of the census in 1870, 28,101 males and 23,321 females, or 51,422 of both sexes, between 71 and 81 years of age; 6,416 males and 5,703 females, or 12,120 persons, between 81 and 91 years of age; 701 males and 688 females, or 1,389 of both sexes, between 91 and 101; and 73 males and 68 females, or 141 persons, as living at upwards of 101 years of age; and altogether over 421*

* 'Tis true the Abbé Tanguay has made sad havoc with this list of 421. I can hardly pardon the reverend gentleman his unsparing—but I grant most conscientious—use of the pruning-knife. He admits into the definitive list of centenarians "only individuals whose ages could be proved by authentic documents, examined with a rigorous scrutiny," and he excludes those whose ages could not be so proved, and 421 have been reduced to 82! Their names and residences are given, and are almost exclusively French, of the province of Quebec. When we reflect how

reported as having reached to upwards of 100 years of age.†

LIFE IN CANADA ESTIMATED COMMERCIALLY.

But private interests and private enterprise often solve problems not otherwise easy of solution. While travellers are reporting upon a country, merchants have opened trade. So also with what relates to climate and its effects on those exposed to its influence. While statisticians are struggling to furnish their meagre returns, Life Insurance companies decide questions of essentially vital interest.

Life Assurance is based upon the science of the general doctrine of probabilities of human life. It is said to have originated in a study of the laws of chance as observed in the experience of the gambler. Much skill has been shown, and much is necessary, in preparing tables, and in determining rates of premium. In it, cognizance must be taken of everything relating to climate, society, &c., and of every circumstance which could influence the tables of mortality. While a too high premium would stifle business; a too low premium would lead to financial disaster. Life Assurance Companies of the highest rank have assigned to Canada a place among the healthiest; and have thought themselves warranted in accepting rates of premium as low as in Sweden and Finland—where the most robust and vigorous health obtains—and lower, up to a certain period of life, than in Great Britain! The branch

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difficult it is, in a new country like Canada, to establish one's age, it is possible the pruning knife may have lopped off not a few who should have been included, among centenarians.

† Longevity in Canada need not surprise those familiar with the influence of its cold dry climate more than the longevity in Russia, which is so great as to have led the editor of the *Medical Times and Gazette* to remark:—"The population statistics of Russia supply so large a proportion of cases of great longevity, as to lead to the conclusion that that country is very exceptionally placed in this matter, or that the figures are not compiled with the accuracy deemed necessary in other parts of Europe."

offices in this country of the most respectable British Life Assurance companies make no additional charge for the expenses of separate management, which they consider is amply compensated for by the good health of the people.

In this connection, in 1864, Mr. Moir, Chairman of the Colonial Life Assurance Company, said: "They had been urged from various quarters, to *reduce* their rates of insurance in certain places. Eighteen years before, the Colonial was considered rather a doubtful experiment from the *rates charged* in *Canada*. But they were founded on reliable *data*."

Dr. (afterwards Sir Robert) Christison, of Edinburgh,—and I could quote no higher authority—after a careful study of Canadian lives with reference to life insurance, found the several causes of death in general, in Canada, to bear the same ratio to the general mortality as in home risks; and that the main differences were, that *inflammatory* diseases of the lungs, and violent deaths are nearly twice as frequently the causes of mortality in the British possessions of North America as at home; and pulmonary consumption also somewhat more frequent; but that dysentery was less so; as also fevers, liver diseases and cholera.

For many years the table of rates for assurance on life, established by the "Standard," was received as the nearest approximation to truth which the science of average could reach, and became *the* standard in all matters relating to life assurance. Whether designedly or not, there was noticeable in Canadian rates a singular departure from the standard tables—a departure which is pregnant with meaning. If reference is made to the adjoining table, it will be perceived that, in Canada, the youth of twenty-one is considered a better risk than the youth of the same age in Great Britain. The former continues to be considered a better risk till the age of thirty-seven, when the premium is the same. After that his chances of life are

made to appear to diminish, and the premium increases at about the same ratio. Not, perhaps, without reason, in our cities, where candidates for life assurance are largely found, and where a life of ceaseless activity and of wear and tear *tells* even upon the sturdiest, who oftentimes suffer from it when they get older. The following are

TABLE OF RATES—STANDARD AND COLONIAL COMPARED—FOR THE WHOLE TERM OF LIFE FOR AN ASSURANCE OF £100 STG.

Age.	Annual Payments.						Age.	Annual Payments.					
	British Lives.			Canada Lives.				British Lives.			Canada Lives.		
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
21	2	1	11	1	19	4	41	3	6	9	3	7	8
22	2	2	9	2	0	3	42	3	8	7	3	9	10
23	2	3	7	2	1	2	43	3	10	7	3	12	1
24	2	4	6	2	2	3	44	3	12	7	3	14	7
25	2	5	4	2	3	3	45	3	14	19	3	17	3
26	2	6	5	2	4	5	46	3	17	1	3	19	11
27	2	7	4	2	5	7	47	3	19	7	4	3	0
28	2	8	5	2	6	10	48	4	2	5	4	6	0
29	2	9	5	2	8	0	49	4	5	4	4	9	5
30	2	10	7	2	9	4	50	4	8	6	4	13	0
31	2	11	9	2	10	7	51	4	11	7	4	16	11
32	2	12	11	2	12	0	52	4	15	1	5	1	1
33	2	14	2	2	13	6	53	4	18	10	5	5	7
34	2	15	6	2	15	0	54	5	2	8	5	10	7
35	2	16	11	2	16	7	55	5	6	11	5	16	0
36	2	18	4	2	18	3	56	5	11	5	6	1	8
37	2	19	10	2	19	11	57	5	16	1	6	7	5
38	3	1	6	3	1	8	58	6	1	1	6	13	7
39	3	3	2	3	3	7	59	6	6	2	7	0	2
40	3	4	11	3	5	6	60	6	11	6	7	7	1

Dividing the foregoing table into decades it will be seen that at twenty-one the Canadian insurer paid, on a policy of £100 sterling, £1 19s. 4d. premium, while the youth in England paid £2 1s. 11d. Ten years later when the Englishman at thirty-one paid £2 11s. 9d., the Canadian paid £2 10s. 2d. At forty-one the balance is the other way; the Englishman now pays £3 6s. 9d., while the Canadian

£3 7s. 8d. At fifty-one the former pays £4 11s. 7d., the latter £4 16s. 8d. And at sixty the former pays £6 11s. 6d., and the latter £7 7s. 1d. It might be gathered from this, that superior staying power is recognized in the former as time wears on; but as I happen to know the reason for this decision, I am in a position to state that the increase at middle life has no reference to diminished health due to climatal influence, but solely to the recognized fact that Canadians of British origin draw more largely, more constantly, and more severely, and not alone by labour, on their strength, than do the residents of Great Britain; and the result is perceptible in the tables of mortality With the French-Canadian element it is not so. It is more conservative of its health and strength, and preserves them longer. In Canada, and especially in French Canada, as, on the one hand, there has been no precocious maturity, there has been, on the other, no untimely decrepitude. Whatever of good has been attained, has been attained by no spasmodic effort at wealth or greatness; but by a steady labour which brought pleasure in its performance, and contentment in its results. This has been alluded to at a former page, where it has been shown from official returns that the octogenarians are largely; the nonagenarians chiefly; and the centenarians are almost exclusively of that nationality.

THE NATURAL INCREASE

of a people varies in different countries; in different communities; and in different states of society in every country, and in every community. I shall not enter into those various circumstances further than by noticing them, nor shall I attempt to deal with the theory advanced by Mr. Sadler, that the prolificness of human beings varies inversely with their numbers. Mr. Sadler asserts that the fecundity of the human species varies in different communities and countries; and the principle which

effects this variation constitutes his Law of Population that "the prolificness of human beings, otherwise similarly circumstanced, varies inversely as their numbers;" or, in other words, "that the prolificness of a given number of marriages will, all other circumstances being the same, vary in proportion to the condensation of the population, so that prolificness shall be greatest where the numbers on an equal space are the fewest; and, on the contrary, the smallest, where those numbers are the largest." This theory has not been sustained in Canada, where the birth rate has steadily increased with increasing numbers, till, in quite recent years, when it has been somewhat disturbed in certain quarters by the demon of prudential desire of limitation, which, like the Colorado bug, must cross the border and produce its work of mischief here. Nor shall I, viewing their short occupation of the soil, attempt to deduce conclusions, as to the fecundity of the British people settled in Canada. The forces which operated upon them, while in their native homes, still, to a great extent, continue their operations here. But in the French-Canadians, long since resident in Canada, and receiving but rarely, and to an insignificant extent, accessions from the land which their forefathers left between two and three centuries ago, we have the most cheering proof that the climate of Canada favours, in an eminent degree, the production, the growth, and the maintenance, of a hardy, long lived, and most prolific people.

The early history of Canada shows us that two and three-quarter centuries ago (1610) there came to this country, as many have done since, a small handful of *coureurs*, to obtain, if not an easier, at any rate a better subsistence than their native land afforded them. The early pioneers were, for the most part, young men, and after a time, families of young men and women; and it will be readily admitted, as a general rule, that only

young persons and families of superior health, strength and vigour came to this country. Those of delicate constitution, who were already diseased, or who dreaded or suspected latent or hereditary disorders, remained at home. To what hardships and privations those children of sunny France were exposed, I shall leave to you to imagine; and now, after a lapse of many years, their fruitfulness exceeds immeasurably that of the French in Europe.*

Charlevoix long ago noticed that prolificness when writing to the King and Queen of France: "Les femmes n'apportent ordinairement pour dot à leurs maris que beaucoup d'esprit, d'amitié, d'agrémens, *et une grande fécondité;* mais, Dieu répand sur les mariages dans ce pays la bénédiction qu'il répandait sur ceux des patriarches; il faudrait pour faire subsister de si nombreuses familles qu'on y menait la vie patriarche, mais le temps en est passé." Their prolificness surpasses immeasurably that of the British in the British Isles; or of their descendants in any other part of the world. They even equal the Irish in their acknowledged fecundity—a fecundity which in them also has been largely increased by transplantation to Canada. What was formerly Lower Canada is, to a great extent, peopled by them. They form settlements all along both sides of the St. Lawrence to the ocean. They people both sides of the Richelieu and St. Maurice; exist in large numbers along

*The women in many parts of France, it is well known, have, during the past century, exhibited an absence of that fecundity the possession of which distinguishes their descendants here. And it is worthy of remark that that part of France (Bretagne) which sent out to Canada the largest portion of her children is that part which still remains most prolific. It is not foreign to my purpose in this connection to state that the descendants of that Britanny which, though in France and of France, preserved its distinct autonomy and traditional liberties as an independent hereditary dukedom until near the time her children sought these shores, has since preserved, at the same time, more, perhaps, than any other part of France, a regard for that old-fashioned idea of the sacredness of pre-natal life, which has saved that section of the country from the crime of tampering with it which prevails largely elsewhere.

the Ottawa; and latterly, the Eastern Townships have received large numbers of them. The factories of the country are worked by them; the land is, in many places, tilled by them; villages and towns are built by them; the learned professions are stocked, over-stocked by them,* and some of the hardier, finding the field of action too circumscribed, migrate to the northern parts of the continent, where they form little colonies of industrious, sober and peaceable citizens. In many parts of the States of Massachusetts, New York, Vermont, Dakota and Minnesota, they push aside the less healthy and less frugal descendants of other countries, and occupy their places. They furnish *voyageurs* to the North-West, and missionaries and Sisters of Charity to other parts of Canada, Red River, Oregon, California. Wherever they go they carry with them habits of cleanliness, order, diligence, prudence and politeness; and although persons of other origins are ready to believe, and sometimes too ready to state, that French-Canadians are wanting in those qualities of mind to fit them for the creation and enjoyment of a higher civilization, that so called higher civilization would be dearly purchased at the sacrifice of some of the qualities which they now possess.

In the first decade (1610) there were no marriages; no births; and no women to marry and bring forth: for the daughters of France had not yet migrated to Canada; and the daughters of the forest were too dangerous of approach. But deaths were already numerous, and chiefly at the hands of the red man. Only one marriage and

* On this subject that clever *spirituel* writer, the late Dr. Hubert Larue of Quebec, says in his Mélanges, what I fully endorse:—"Au sortir du collége, le jeune homme, s'il n'embrasse l'état ecclésiastique, voit s'ouvrir devant lui trois carrières, toutes aussi encombrées, toutes aussi ingrates, l'une que l'autre. Trois carrières! Voilà le cercle étroit dans lequel tournent toutes les ambitions du jeune Canadien instruit. Il faut qu'il se résigne à se faire ou notaire, ou médecin, ou avocat; hormis qu'il se destine à devenir d'emblée membre du Parliament Provincial."

one birth took place in the second decade. Two marriages and three times that number of births took place in the third decade; and still the deaths, chiefly by violence, were greatly in excess. But in the next decade French maidens from Normandy, Bretagne, Anjou and Champagne came hither; marriages—early marriages—took place, and the excess of deaths over births came to an end. In 1710—one hundred years after the first arrivals from France, there had been celebrated 5,375 marriages, and these gave 27,969 births. One hundred years later the marriages had reached 87,403 and the births 513,461. Fifty years later the relation of marriages to births still continued to obtain.

It would be impossible to place in a clearer light the remarkable prolificness of the Canadian people than by the figures I have mentioned. Adding these years together, the number of marriages in 285 years (1610 to 1875), in the Province of Quebec alone, from among that section of the people, according to the last census, was 415,762; the births 2,484,089, or, in round figures six births to a marriage; and the deaths 1,194,806—making an excess of the former over the latter of 1,289,283, or nearly 100,000 more than double.

In the latter years, it should be observed, the French-Canadian element was not the only factor: the aborigines now exerted considerable influence; and the sons of Ireland came hither, and their quivers, too, were full; and what was at first a population of a single nationality, now became, for registration purposes, a section of the population according to religious belief.

The rapidity with which population increases in Canada, even in districts which are not now receiving additions from abroad, is something wonderful. In many districts the population is doubled in fifteen or sixteen years. This is due, in a great measure, to early marriages, which are here everywhere encouraged. The Canadian woman is not

averse to having a large family; and she considers herself most blessed who has the greatest number of sons and daughters. The population increases by virtue of the number of marriages, and this number augments in proportion to, and sometimes, it might seem, in advance of, the facilities for supporting a family.

Some writers have been so bold, and some so immoral, as to question, in the interests of the state, and of the individual, the wisdom of early marriages. The older established countries of Europe have here and there furnished numerous examples, now less common, of the advantages of early marriages; and from among them I shall take, as best suited to my purpose, an instance from Dundee in Scotland. Upwards of one hundred and fifty years ago (1732), an Independent Congregation was formed in Dundee, by Mr. Glass, which afforded a decisive proof of the importance to population of early marriages. In sixty years it increased from 71 to 1,160 members, men and women. The writer, Robert Small, D.D., from whom I quote, says: "The increase is much more the effect of an indispensable law of the Society enjoining early marriages, than of new accessions of proselytes. Besides the importance of the law to population, it appears, from the experiment, that it is also of the utmost consequence to prevent licentiousness, and to promote early industry. The usual objections of its tendency to promote a debilitated race, and to increase the number of the poor, appears to be in a great measure frivolous. * * These young people do not seem to be inferior in health and vigour, with the ordinary natives of the town." The Rev. Dr. Small's experience in Scotland is more than realized in Canada, where young fathers beget, and young mothers bring forth, and nourish from their own breasts, a progeny which, in no part of the world, is excelled in health and vigor. In society, in many places, now-a-days, however young, rendered old by its own progress, the rich, alarmed at the expen-

sive habits of the women, defer, till as late a period of life as possible, to form an establishment ;* while those without means live a celibate life which sometimes troubles marriage. The poor, under these circumstances, have few children; the rich may have less; and the artizan often receives the new born as an additional burden difficult to support. This disorder—this departure from what is natural—is visible in all large cities on this, as on the old continent. Indeed I believe many of the cities and towns in the northern States of America present as marked examples of this baneful influence as any in Europe; and is one of the greatest evils arising from a rapid gain of money, and, *pari passu*, a begotten desire for extravagant display. In Canada that influence is but partial, even in cities; while, fortunately, it has not reached our country districts; and I hope the day is far distant when a future writer will be in a position to chronicle a different state of things as existing in Canada—where the pitiful results of a depravation of morals, of idleness, and of a love of pleasure will have changed the condition of the inhabitants in this regard.

The peasants of this country are much like those of Norway in their manners and customs, and not unlike in their occupations, where the wants of each household are supplied in great measure by the labour of each household. But the near neighbourhood, here and in the adjoining union, of populous towns and cities, permits an easy change of place, and permits, at the same time, what

*I do not know where the descendants, in North America, of the Anglo-Saxon get their apparent discountenance of early marriages. Certainly not in the country whence their forefathers came, where, until the middle of the last century, the marriages of girls of thirteen and fourteen, whether rich or poor, were common; and where girls were married at a much earlier period. The age of twelve was placed as a limit under which suit might be taken to annul a marriage on the ground of undue influence of parent or guardian. Above that age it was irrevocable. Below that age it was often considered binding in conscience, though not in law.

the prudential Norwegian does not avail himself of—those early marriages, which, in Canada, are doing so much more than in Norway to people the country.*

There are at present in Canada 2,217 married men under 21 years of age; and under the same age, 19,540 married women. Of these young married men, Quebec has a portion much greater than the average for the other Provinces of the Dominion generally. In the other Provtnces, men, as a general rule, marry later in life.

Whatever exception may be taken to Mr. Sadler's theory of population, it may safely be admittted as a fact, so far as Canada is concerned, that in the larger towns and cities the number of births to a marriage is smaller than in lesser towns and in the country. But the explanation, it appears to me, is not what is given, nor is it in accordance with a law he would wish to have recognized as regulating increase.† It may be attributed to other circumstances than that prolificness is in inverse ratio to numbers. Rather may it be attributed to diminished health and want of tone dependent on confinement, insufficient light, and pure air; and more than all, to habits of a nature to abridge life, which are often engendered by clustering together.

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* "On se marie jeune en Amérique," says La Rochefoucauld Liancourt, "surtout dans les campagnes, le besoin qu'ont les jeunes gens, qui généralement s'établissent de bonne heure, soit dans de nouvelles terres, soit dans une profession quelconque, d'une femme pour les aider dans leur travaux, y ajoute, pour ces mariages prompt, un motif puissant à celui de la pureté des mœurs. . . . Dans les campagnes la femme est, comme en Europe, une amie nécessaire aux travaux; elle est l'âme du ménage. Elle est, pour l'homme occupé dans les affaires, et tout le monde l'est en Amérique, une ressource indispensable pour les soins domestiques; elle est une compagne assidue, une société qui se retrouve toujours dans un pays où il n'y en a pas d'autres que celle de la famille, et où les enfants quittent promptement la maison paternelle."

† In Russia, where the winter is as ours, there is one born in every 21 to 23 souls; while the deaths are 1 to 30-33 souls. The average increase, therefore, according to Mr. Christmas, would be about 6.547. The cold of that region does not hinder fructification; and that is often taken as the measure of a people's health, as well as, I may add, of a people's virtue.

In our country districts the men are temperate; the women are mild, modest and agreeable, and with an intelligence generally superior to the men, whom they advise and influence by reason of those qualities. They live in a state of concord; the security and the equality which arise from the possession of property, engender and foster it. Comfort (again, Crabb must pardon me) is met with everywhere. There is no luxuriousness with misery in its train. There is not that afflicting contrast of individual wealth and squalid misery. There are none so rich but others may become as wealthy; and none so poor as to make their lot pitiable.

The *habitant* woman, on her part, so soon as she foresees that she is to assume the functions of maternity, clearly recognizes its duties and responsibilities, and prepares herself for them. She becomes indifferent to everything but the preparation for the new arrival: her figure is neglected, and throughout her married life, she permits it to depart widely from what is commonly considered the line of beauty; though in reality of false art, and not the line of nature as we see it in the new-born. No corsets constrict her waist, which soon becomes as wide as, if not wider than, her haunches; and these form the base of a double cone, the apices of which being at the feet and shoulders.

This [illegible]m from restraint fits her admirably for her full[illegible]ized functions; and ensures safety to the n[illegible] state and character.

INFLUENCE OF HOT AND COLD WEATHER.

The climate of Canada affords us an opportunity of witnessing the influence of hot, cold and mild weather on the tables of mortality. The result differs much from what is found to obtain in Europe. In Great Britain the hottest months are unhealthy, but, after a certain degree of temperature is reached, the ratio of mortality *increases*

with the diminution of heat, especially when accompanied by moisture. In Canada, mortality commonly *diminishes* with the temperature, and the coldest weather is often healthier than the warmest. Even the milder weather of autumn and spring is not more healthy than winter. Extreme cold is not that trying season which, *à priori*, one might suppose. The diagram I shall presently show most fully refutes that supposition. The colder parts of Canada are in reality the healthier.

In 1871 the population of the Dominion was considered to be 3,485,761; and the number of deaths 47,314. The considerable birth rate in the Province of Quebec gives it a correspondingly large death rate at all seasons, and disturbs most markedly the general average.

During the months of June, July and August, mortality in some places reaches almost one per cent. of the inhabitants of the large cities; in winter it sinks nearly one-third; the ratio is a fraction higher in autumn than in spring; and the latter is much more healthy than summer.

The largest mortality in any month of the year in the whole Dominion, or in any section of it, is in March, when the tonic influence of the cold is withdrawn. At other seasons, localities are influenced to a great degree by the preponderance of their maritime or continental features. The cold and damp winter weather of Nova Scotia and New Brunswick affects health differently from the cold and dry weather of Manitoba, Ontario and Quebec; while the summer temperature of moderate heat with moisture, confers upon the Maritime Provinces exceptional advantages in this regard—advantages which should be availed of by those who desire immunity from excessive heat in summer. These circumstances, and others still more potent, to be alluded to later, must be borne in mind in considering the following figures, which otherwise would be misleading.

The mortality for the whole Dominion, divided into months and seasons, is as follows :—

December	3,818	
January	4,039	
February	4,148	
	12,005	—Winter.
March	5,288	
April	3,342	
May	3,368	
	11,998	—Spring.
June	3,407	
July	4,413	
August	4,733	
	12,553	—Summer.
September	3,888	
October	3,482	
November	3,166	
	10,536	—Autumn.

Winter climate in Canada must be regarded in connection with the constant efforts to elevate the indoor temperature to, and sometimes above, summer heat ; and with the disturbances of the respiratory and digestive systems which are thereby engendered.

In Montreal the ratio of mortality is as follows :—

Spring	0.685
Summer	0.993
Autumn	0.618
Winter	0.613

This is an emphatic refutation of the assertion that the Canadian winter is a trying season. Were we to deduct the number of deaths arising from imprudent exposure ; from frost-bites and resulting surgical operations ; from fractures and other injuries incidental to the season and to our different modes of progression, the ratio would be still further decreased. Yet even as it is, winter compares most favourably with the most salubrious seasons of the most

salubrious climes. Autumn here comes next in order. Liver affections arising from the previous heat are then more troublesome; and disturbed digestion, from the use of large quantities of fruit, is more common. Spring, the season most dreaded, and with reason, by the consumptive, comes next; and, lastly, summer with its train of gastric disorders. The high ratio of mortality in summer in some of our larger cities, and especially in Montreal,* has been to some extent thus accounted for: A certain degree of heat evolves a certain quantity of deleterious gases, and every additional degree evolves an additional quantity, and perhaps a new kind and quality. Thus 70° will cause the evolution of more than 65°; 75° more than 70°, and so on. Whatever may be the explanation, the fact is undoubted, that in our cities, mortality usually bears a direct ratio to the amount of heat.

It is during July and August that diarrhœtic complaints are so common. But these must not be attributed to the prevailing heat. Dr. Larocque, Health Officer in Montreal, is not unfrequently accustomed, when speaking of those summer complaints, to add: "Result of improper alimentation." He is right.

This is the season which is considered to be so severe on young children, especially on those who are being spoon-fed. But inattention to those changes which a high temperature quickly effects in milk and other diet has more to do with those disturbances, which are so common, in the digestive tube than has the direct influence of a high temperature on their infant bodies. It is not the body which most suffers; it is the food which enters it which

* It is difficult to avoid a running commentary on the causes of the disturbances of the general average of mortality in some of our cities, and notably in Montreal. But, with the exception of St. John, N.B., the number of persons per square mile in Montreal is much greater than in other towns and cities of the Dominion. In Quebec, there are 5,172.8 persons per square mile; in Toronto, 6,025.6 per square mile; Kingston, 4,829.5, and so on; while Montreal has a population of 20,800.2 to the square mile, or 32.5 per acre.

has undergone fermentation or other change. In cities this is particularly the case. Obtaining *fresh* milk more than once or twice a day is difficult even for the rich; while for the poor it is impossible. This is now the harvest for those commonly indifferent, and frequently pernicious substitutes for milk which fill the columns of the press, and which are placarded so extensively. I shall allude to this question at another place.

AS A RESIDENCE FOR INVALIDS.

It requires not the sanction of ancient or of modern authority to confirm our belief in what is not only reasonable, but apparent to every one concerning change of climate. We all know that a change of residence from the city to the country commonly produces a sensible change in the economy; colour heightens, and health generally is improved. Sir James Clarke says:—"The influence of climate has been long established as a matter of fact, and physicians have, from a very early period, considered change of climate and change of air as remedial agents of great efficacy. Diseases are often benefited, and not unfrequently cured by simple change of situation." For the prevention and cure of a numerous class of chronic diseases we possess, in change of climate, and even in the more limited measure of change of air in the same climate, one of our most efficient remedial agents; and one, too, for which, in many cases, we have no adequate substitute.

Cases are now and then met with of diseases having been eradicated by a removal from one part of the country to another. This is the experience of those who live in Great Britain, which is encircled by the sea, and at no point is far distant from it. How much more should it be the case in Canada where every variety of temperature; every degree of moisture; every kind, quality and condition of wind may be met and wooed; and where,

within our vast Dominion, a limit is put to a change only by the Pacific, the Atlantic, and the Arctic oceans.

A change of climate produces most sensible effects on the digestive and the respiratory organs. Although the stomach and lungs sympathize extensively with each other, and the changes which would benefit the one might also be supposed to benefit the other; yet it may be asserted, with more approach to truth, that a change which would benefit the one would not be prejudicial to the other.

Canada presents, in many repects, important advantages to the dyspeptic and the consumptive. "When the invalid," says a high American authority, "in quest of purer summer air in connection with exercise and recreation, arrives on the southern shore of Lake Erie, let him turn either to the north-west or north-east. In the former case he will make the voyage upon the upper lakes; and in the latter he will descend Ontario and the St. Lawrence, viewing objects which will much interest him, and returning with renewed health, which will much gratify him. If any testimony of mine be of value, I cheerfully add it to that of Dr. Drake. Many thousands of the American people annually profit by this advice, and the upper lakes and the St. Lawrence are favorite resorts with the dyspeptic and the consumptive, as well as with the pleasure-seeking tourist.

Great as is the territory of our American neighbours, there are wanting in it certain features which, on the western side of the Atlantic, are obtainable only in Canada. "Nearly all the settled portions of the southern or Mexican basins are comparatively flat and uniform," says Drake, "without lakes or mountains, and deficient in running streams and waterfalls. The basin of the St. Lawrence is its North, and opens to its invalids in hot weather a retreat which they cannot have in any other direction; for the northern portion of the Appallachian Mountains are too inaccessible, and the Rocky Mountains

too remote.* It is not sufficient for the physician to advise his patient, labouring under a chronic infirmity, to leave off medicine and depend on travel. When he prescribes the former he directs where it could be obtained; and, in like manner, when he recommends the latter, he should be able to lay down the appropriate and practical route; in doing which he should draw his information from the books of his profession, and convince his patient that he is familiar with what he recommends, or but little confidence will be reposed in his advice." It is of still greater moment, I may add, to advise whether the patient should or should not exchange, for travel, his comfortable home and the cheering society of friends. Latterly it has become somewhat less common, I am glad to say, for the invalid to while away the few remaining sands of life in the cold apartments of a distant or cheerless hotel, where persons in health surround the invalid and have no sympathy for him; or to pass a few suicidal weeks in the comfortless cabin of a fisherman, trying—because the hardy seaman thrives upon it—to eat food against which the appetite revolts, and dying, perhaps, away from home and the members of his family.

I shall first allude, briefly, to disturbances of the digestive apparatus, believing, as I do, that a vast number of cases, whose end is consumption, have their origin in disorders of the digestive and assimilative systems.

Dyspepsia is co-eval and co-existent with civilized life. One of the, if not the primary, at least permanent and pronounced indications of disturbance in the digestive functions is a peculiar depression of spirits. Invalids so afflicted have commonly noticed in themselves an early return to cheerfulness under the exhilirating influence of a Canadian winter atmosphere. They recognize that the

*Drake wrote this before railroads brought the Rockies within comparatively easy access; but the land journey, though quicker and shorter, must continue to be fatiguing.

cold air of Canada is especially useful in disturbances of the stomach. In dyspepsia, when the organ has been overworked, the cold air relieves it, if overwork of the organ be not continued. Many experience entire relief from its more distressing accompaniments. The blood formed is better oxygenized, richer and purer; and the nervous functions are better performed.

But it may be claimed, and with fairness, that our summers are as the summers in many parts of Europe. So they are in some respects—not all; but our winters are *sui generis*. A single winter in Canada, and with plain food, temperance, and much active exercise in the open air, the bile tint of the jaundiced—unless caused by mechanical obstruction or malignancy—usually disappears, and skin and eye regain their native colour; the stomach is again fitted for its functions; digestion is more easily performed; and the enlarged liver often loses its preternatural bulk, tenderness and hardness, till, like wounded Sarpedon, the patient revives

"By breathing airs refresh'd that fanned him from the North."

The bright, cold, clear light, reflected at every possible angle from the countless snow crystals which cover the earth's surface, renders the light intense, and though often borne by the eyes with difficulty, the stimulus to the mental and physical is marked; and, if accompanied with, and aided by temperance and active exercise, it produces a most exhilirating effect. "The constant exposure to the clear, bracing air of Siberia, with all its ice and snow," says Mr. Michaeli, "cannot but be beneficial;" and as our climate equals it in clearness and coldness, and surpasses it in dry, stimulating and exhilirating qualities,—qualities which render the low temperature less sensible—it surpasses it also in salubriousness.

When the air is pure and subtle, as in winter, there is greater freedom of respiration; greater elasticity in the mo-

tions of the body; the spinal functions, and diastaltic activity are stimulated; and there is a newer, a greater clearness in the *morale*. On driving over a vast expanse of pure white snow, with the thermometer near zero, and with a dry, clear atmosphere, our horses feel the influence. They are impelled to more than usual activity; while, with us, the thoughts are elevated beyond the dwellings of men and their smokiness, and the mind partakes of the serenity which surrounds it. Almost every one has experienced those emotions on those beautifully clear days of December, January or February. There is a disposition to serious but cheerful thought and reflection, untinged with melancholy. Pleasant grounds and verdant meadows have their suggestions which poets may shape into verse; but our beautiful winters minister much to man's happiness, and without alloy of tormenting passions.

Should dyspeptics; or should those suffering from impoverished blood; or with nervous systems, shattered or unstrung by mental fatigue or dissipation, doubt this, let them place themselves where the cold, dry, and highly electrical condition of the atmosphere might produce their unchecked, unhindered influence, and it would, methinks, be conceded, that those conditions of atmosphere are not to be undervalued. Many and many a time I have urged the dyspeptic—him especially of the thick, pallid, or sallow skin and over-tasked stomach, to shoulder his gun and to betake himself to the woods—*grands remèdes de la médecine et de la morale*—and the result has been: improved appetite; easier digestion; greater freedom of expansion of the chest; and a nervous buoyancy to which he had long been a stranger.

Some years ago a patient, after a too close application to study, and a too little use of his teeth, had so impaired digestion as to render himself unequal to mental labour. I suggested to him to take his fowling-piece, to trust to it for support, and to start for the forest—his only additional

food to be hard-baked oaten-cake. He was to look to his fowling-piece for seasoning as well. But, like Hiawatha, he

"Sought for bird and beast, and found none.
Saw no track of deer or rabbit. In the snow beheld no foot-prints."

The oaten-cake became a luxury! but oh! what luxury of the season could equal it, when a backwoodsman whom he met furnished him with some fat pork, which he ate *raw*, with avidity. "I can now," he says, "recall, after many years, the deliciousness of that repast. I have since travelled much in Europe, but no French or Italian *cuisinier* has ever furnished to my palate, since then, so exquisite a morsel." He returned after a few days with dyspepsia gone; with an abundant flow of spirits; and with a vigor of body, equal to any labour; and these have not since deserted him.

Consumption.

Consumption is still more extensive than the preceding disturbance, ramifying and extending its wan features where civilization never reached, though usually more common where depraved digestion has *prepared the way*. To the weak-chested; and to persons of a scrofulous habit in whom tubercles are not yet developed, but in whom, from general appearance and family history, their deposition may be anticipated, Canada presents great advantages, and even

"Italy—fair Italy,
The land where the lemon tree blows,
And in darker leaves bowered the gold orange glows,"

with "its feet resting against the snow-capped Alps, and stretching towards the burning shores of Africa," must yield to it. For that favorite resort is alternately exposed to the suffocation of the sirocco from the arid sands of Lybia; and to the icy chill of the tramontane from the Alps or the Appenines. There the changes of temperature are not only frequent but extensive.*

* The month of August in Italy is "that which brings fever with it; makes parents tremble for the lives of their children; opens wills, and

Sir James Clarke, speaking of different parts of Italy, says :—Naples, another favourite resort for the invalid, is altogether an unsuitable residence for pulmonary invalids. Malaria, that lingering consuming disease, so generally seen and so little understood, which induces the pale yellow cheek, hollow sunken eye and slouching gait, annually carries off 50,000 victims.† I need say no more of the relative salubrity of the two countries. The vicissitudes in temperature here are not so frequent nor so great ; and the houses, even of the poorest, are much more comfortable.

In Canada, scrofula, consumption, bronchitis, asthma and rheumatism, are, on the whole, more frequent in the more humid western districts, and in the more humid Maritime Provinces ; while pneumonia, and pleurisy and the inflammations of serous membranes generally, are more common in drier, colder, eastern Canada. The former localities may be compared, *quo ad* those diseases, to the lower levels in Alpine regions ; and the latter to the higher levels. It may be here observed that "tubercular disease is unknown among the inhabitants of the high Alps, notwithstanding their hard life, and, sometimes, insufficient food." In the early stages of consumption, even high Alpine air, but in sheltered valleys, has been found very useful. A knowledge of these circumstances will sometimes facilitate a choice of climate within the Dominion.

Persons in whom tubercles are being deposited, or are already deposited, would be benefited by a residence in

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calls the undertakers into activity." So, at least, wrote Horace long ago, in his epistle to Macænas.

† As a set off against the pernicious influence of malaria, it is claimed that it prevents phthisis. This claim is untenable. The malaria arising from the marsh lands of Italy, and the intermittent arising from the marsh lands in western Canada, in no wise prevent, cause, modify or influence the development of phthisis ; nor, so far as I can learn, does either of itself bring remedy.

Canada. But for those in whose lungs tubercular-softening exists, and cavities, large or small, have formed, this is not the country. The air is too stimulating, and death, in most cases, would unquestionably be hastened. There are two periods of the year, however, during which persons possess peculiar immunity from chest affections of a consumptive character: mid-winter and summer. Spring and autumn are dreaded by the invalid; and it is during those seasons, particularly during the former—when the tonic influence of cold is passing away—that consumption more generally advances or terminates fatally.

When a consumptive patient presents himself, and, upon examination, his lungs are found to be riddled with tuberculous cavities, it is useless to speculate on the climate most suited to his sad case. He should stay at home where he will have the cheering and sympathetic society of friends and relatives; who will care for him in his last moments; and who will smooth for him the pillow of death. Any part of Canada will do as well as any part of Europe to die in, under such circumstances. But if tuberculous matter is being deposited, or about to be deposited, there can be much done for him; particularly if attention is directed, as it always should be, to the cause and origin of the disease.

That tubercles should thus be removed from the lungs is quite conceivable, when we remember how much they are caused by imperfect digestion and assimilation, and the inadequate formation of rich blood.

There are two conditions of the lungs which are much benefited by a Canadian climate—namely: that condition commonly termed imperfect expansion; and consolidation.

For some time before the deposition of tuberculous matter; or rather some time before the stethescope can clearly detect its presence, the natural respiratory murmur (vesicular, in medical language) becomes less distinct, or

interrupted and halting; and not continuous as in health. The lung thus showing signs of weakness, or of nothing more, may remain in this condition for a longer or shorter period—sometimes returning to the condition of health, which it has barely left—sometimes proceeding onwards to unmistakeable disease. It is now, before such progress has been made, that a dry stimulating climate would effect much. In that other condition—the stage of deposition and induration—the first stage of recognizable disease (though in reality a stage subsequent to that other condition just described), where no cavities as yet exist; and where there is no undue bronchial irritation, the winter climate of Canada is of great value, and acts, as acted pure air and abundant light on the lungs of Cruveilhier's rabbits, in which tubercles, which had been created for experimental purposes, were removed.

Many of the more eminent physicians of Europe, and chiefly of Great Britain, send patients threatened with pulmonary consumption on whaling expeditions off the coast of Greenland; and many lives are saved in this way. Some, however, are sacrificed, for whaling expeditions are not always easily arranged for, and are attended with risks and discomforts of a nature to counter-balance, in great measure, the advantages of change of air. Besides, they cannot be availed of by the very young; or by the old; or by females.

More recently, attention has been directed, in Europe, by those who believe in a cold, dry climate, to Canada; and persons threatened with phthisis have been sen thither in considerable numbers. The advantages of a winter residence in Canada are found to be quite equal to those attending a whaling expedition; and discomforts do not obtrude.

Writers on the diseases of hot climates are in the habit of recommending those of consumptive habits acquired in hot regions, to pass a winter in the south of Europe

before they land in England, giving, as a reason, that such persons ill-bear a too sudden change from a hot to a cold climate. To Canada, however, these remarks do not apply. The absence, in the air of Canada, of that moisture which renders the atmosphere of Great Britain so distressing to consumptives, makes the air of our country agreeable. Not that I should always counsel an immediate transition from the heat of India to our hyperborean winter. Indian officers, however, have more than once passed direct to this country, and commonly with advantage; and my memory recalls many, who, having returned to Europe and having had their symptoms aggravated, found that a short residence in Canada restored them to comparative comfort. Those especially, who have come direct from India to Canada in autumn have noticed this change.*

In selecting a proper climate in Canada—and in Canada we have almost every variety of climate—we are somewhat restricted in our selection; for as comfort is essential to enjoyment, those places must needs be chosen where comfort may be most easily obtained. It is impossible to lay down general rules for one's guidance in special cases. One's judgment and discrimination must be exerted. The western lakes would suit some; the more sheltered parts of the St. Lawrence valley would suit others; the hilly districts of St. Jerome and St. Hilaire would benefit a third; the Saguenay, Cacouna, Murray Bay, Gaspé, Baie des Chaleurs, etc., would suit a fourth; the western regions of Winnipeg, Qu'Appelle, Calgary, would best suit those who require the condition of greatest dryness, while the soft-balmy air of the Pacific coast, or the attennated air of the Rockies,—moisture-laden on the one side, drier on the

* One of my former pupils, a prize man at graduation at McGill University, became surgeon in the line, and went to Bombay, India, with his regiment, where he contracted phthisis. He was sent to an elevated station, the sanitarium at Kandallah, where he experienced temporary relief. He was then invalided and came back to Canada. In passing through Great Britain the humid atmosphere was unbearable, and his

other--would complete a variety of climate such as no other country could equal. Some require a bracing, stimulating air; others a sheltered residence; while a third might be allowed to choose the route and residence offering the greatest attractions of convenience and comfort in travelling and in living. North and south are not the only questions when climate is concerned—and even the poles or the equator are but one element thereof. During the summer, safe retreats are to be met with all over the country—on the sides of hills with no adjoining swamps or morasses; where a dry soil, moderately wooded, receives, during a great part of the day, the rays of the sun.

A change of residence from the dry climate of the interior to the lake regions, and more markedly still, to the lower St. Lawrence, is sensibly felt, and is within the range of almost every one's observation.

Those who can afford to do so, often select in summer either shore of the Lower St. Lawrence with its numerous watering places. When their ailments proceed solely from debility, they no sooner begin to breathe the cool and vivifying air from the Gulf, charged with the perfume of fern and sea-weed, than their ailments are ameliorated; and with appetites sharpened, and the powers of assimilation increased, they receive a new stock of strength and vigor. There are, however, circumstances of a medical character which forbid many availing themselves of those summer retreats; and which prevent those who do deriving all the advantages they should; and to these I shall allude at the proper time.

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breathing became very labored. After his return to Canada, his breathing at once became easy; and though somewhat familiar with writings on the influence of climate, he was not prepared for so marked a change in this respect. He felt, so he told me, as if he were breathing, not atmospheric air, but oxygen—so refreshing and invigorating it seemed to him.

PART III.

Man's history, says De Bonstettin, is like a piece of tapestry over which divers coloured threads appear and disappear as they traverse the meshes of its woof. Climate is a thread of this description, appearing—and never entirely disappearing—at the bidding of the Great Disposer of all things. Human actions not being wholly traceable to climatic agency alone, we must possess some knowledge of the various causes otherwise affecting them before we can assign to any a special influence. Until this knowledge is obtained, abstractions are pointless. This leads me to consider other agencies, besides the atmosphere, which influence us; and chief among them are

THE HABITS OF THE PEOPLE.

I shall not attempt, in the few moments which remain, to say more of those thousand ills that flesh is heir to everywhere, and in Canada as elsewhere; but shall confine myself to a brief consideration of some of the more marked habits of the people of Canada, and the influence of those habits upon their life and health. But it may be asked: have the habits of a people much to do with their state of health? And it may be replied: Nations, like individuals, remarkable for their vigour, strength and longevity, have been equally remarkable for their observance of a certain standard of living; and especially remarkable for their temperance in eating and in drinking; their fondness of exercise; their avoidance of excessive stimulation. The old Ciceronian adage: "Vitio depravatæ consuetudines degenerant," is ever new and ever true.

The ancient Romans, while conquering the world, were

distinguished for their frugalness; and the best Roman soldier was he who was trained to march the farthest; carry the greatest weight; endure the most fatigue; and sustain the longest fasts upon the road. Such were the ancient Romans when subduing the powers of Europe. But what was the physical condition of the Romans when the Goths and Vandals overran them? They had sunk into effeminacy, and had given themselves up to wine and sexual excesses. And what of the nation which conquered them? The Allemanni could live on any thing; could run with horses; abstain from drink like camels; and subsist on roots and herbs. They were powerfully made, broad-shouldered, heavy-browed men, with coarse shaggy beards, indicating strength; and broad foreheads indicating intelligence. It was not climate alone which exerted on them its influence; for the descendants of the same Allemanni, continuing to be exposed to the same climatic influence, for many generations in recent times, seemingly paralysed with lager, would pass hours watching the curling of the smoke from their meerschaums, and dreaming of that Einigkeit* their ancestors would have quickly realized. Hardy and vigorous as were the Allemanni and the early Romans, we equal them. Effeminate as were the Romans when they were overrun, and the Allemanni who overran them, we have their counterparts too—not produced by climate alone, but by the habits and traits of character with which that climate has been ultimately associated. I shall attempt to sketch them only when, by their singularity they arrest attention.

In a country like Canada this is a matter of difficulty, for moral and social phenomena have a tendency, in a heterogeneous population such as ours, mutually to annul and destroy each other. Still the heterogeneousness of that population may aid somewhat in apportioning to climate

*The reassertion of their ancient spirit has at length, by force of arms, realized the nation's dream of unity.

what is its share: and to social habits what are, to some extent, theirs.

There is, so far, no clearly defined standard or model in the habits of any people to which we may appeal with certainty; and least of all in the people of Canada, where some take the general outline of indigenous customs for their guide—thinking, that if they err, it will be on the safe side; while others bring with them the customs and habits of the countries whence they came. The first may be a good rule when sanctioned by reason But residence alone confers immunities in which the stranger must not expect at first to participate. The second is good or evil, as the customs and habits may be suited to the newer circumstances in which they are followed. Far, then, from slavishly imitating the customs of Europeans, it would be safer to do so than to violate the laws of health as we are accustomed to do. The altered appearance, frequently noticeable, of persons residing in this climate are less due to a slavish adherence to, than to a reckless departure from, the customs of our European cousins. Nay, more, after a close observation of the habits of the people here and abroad, candour compels me to admit that the laws of health are more frequently violated here. Indeed, were I asked to point out, on the map, those parts of the earth's surface where many of the people paid least regard to the precepts of health, and seemed most to ignore the principles which should guide them in the selection of food, clothing, exercise, ventilation, etc., etc., my finger should rest, most unwillingly rest, on Canada and the northern United States.

Immigrants to warm countries are advised by medical writers to observe strictly two fundamental rules: temperance and coolness. The latter we endeavour to observe during the warm months of summer. A third rule, applicable to the climate, is to preserve the natural heat of the body; not by increasing the temperature of the air which

bathes it, but by suitable covering to prevent the dissipation of the normal heat of the surface as rapidly as it is generated within the body.

Clothing.

The great variety of Canadian climate; the great range of temperature alone—apart from other meteorological conditions—from uncomfortably warm to extremely cold—may be inferred from the circumstance that while, in the milder portions of Canada, persons dress as in the south of Europe, in thin cotton and linen; in some of the severer parts of what is now the Dominion, the native women, to protect their infants from cold, carry them between their reindeer skin jackets and their bare backs. In the warmer parts of Canada, during a great part of the year, children of even the farming class go barefoot; in the colder parts, the long, well-lined sealskin boots, and woollen socks, are not too much to preserve the natural heat.

One might *à priori* suppose that, in all cases, that kind of clothing would be selected which would best favor the cuticular discharge in summer, and best retain the heat of the body in winter. The principle is so simple, and so easily carried into practice, that one might well wonder when one sees the large number of deaths resulting from violations of those rules, particularly in the colder seasons. In country districts chiefly, there is, in winter, a wide difference between the clothing of the *habitant* and of his neighbor, the British resident The Canadian peasant is always comfortably and suitably clothed. His wardrobe is abundant, though limited perhaps to *etoffe du pays* and home-made flannel. He wears a woollen tuque; grey homespun overcoat, loose around the body, buttoned at the throat, and secured by a sash; one, sometimes two pairs of socks, with *nippes** for the toes; the

* *Nippes* are a most sensible article of protection for those parts of the body furthest removed from the centre of circulation; and consist of a

whole enveloped in deer, or well-oiled beefskin moccassins. His feet are, as he says, *a l'abri de tout froid.* The old countryman, on the other hand,—particularly he who scorns to imitate the customs of his French neighbour—wears two, sometimes three coats—generally opened at the breast; two pairs of trousers; a pair of socks and hard boots. The feet, during severe weather, are the first to suffer; and when we hear of persons who have been partially frozen, the feet are the parts which commonly demand the surgeon's knife. But even should the lower extremities themselves escape, their undue exposure produces mischief far from the site of most rapid abstraction of heat. Cold to the feet may disturb the active circulation of the parts; but by means of the extreme nervous sensibility of the soles of the feet mischief is lit up elsewhere. I have many times known fatal laryngitis to follow quickly on the sudden exposure of the bare feet to severe cold. A sudden feeling of constriction of the upper part of the windpipe is experienced, which sometimes kills in a few hours. I have never known it to occur in this part of the country except to persons who had rushed out shoeless and stockingless into severe cold, or who had deeply inspired air of a very low temperature. But in colder parts something of the same kind has been noticed on the sudden transition from hot to cold air. This, however, only occurs when the cold air is drawn in through the mouth, instead of through the nostrils, as if the mouth were a part of the respiratory tract, instead of a part of the digestive apparatus.

The difference in the mode of clothing which we observe in the British and French-Canadians has not been without its effects. I had long remarked the relatively high ratio of mortality, from inflammatory affections of

piece of flannel or woollen cloth folded loosely—outside or inside the sock—over the extremities of the toes. The narrow-toed boot would not permit this covering; but the narrow-toed boot is not worn.

the chest, among the descendants of the English, Irish and Scotch residents. This has not escaped the notice of physicians generally, and the late Dr. Peltier, who was intimately acquainted with the habits of both peoples, more than once expressed the same opinion. To test the matter, I examined the records of the Hôtel-Dieu and of the Montreal General hospitals here. The result in this respect was anything but favorable to the British. Although the number of French patients was far in excess, they formed only 30 per cent. of all the chest affections. The English, Irish and Scotch absorbed 70 per cent. of all the cases of bronchitis, pleurisy, and inflammation of the lungs! On enquiry into the history of the affections at the hospital to which I belong, more than 90 per cent. were referrible to imprudent exposure.

The great mortality of early life from inflammatory affections is due to this cause. The infant's power of resisting external cold is feeble. The small power of resisting cold, or of maintaining an independent temperature, is, as Dr. West observes, the distinguishing peculiarity of early life. If exposed to a low temperature, its respiratory movements increase in frequency; and if not restored to a warmer atmosphere its nervous energy is depressed. The children of the poorer classes, especially, are insufficiently protected against the inclemency of winter; and the clothing, which may be sufficient, or even excessive, is improperly distributed.

A fatal error has possession of the minds of many that the part exposed is the only part which can receive injury from exposure; and alarmed at the frequency with which their children are seized with inflammatory affections of the chest, parents do all in their power to protect the organ which they consider most in danger. Yet, notwithstanding, the lungs, pleuræ or bronchial tubes become congested and inflamed, and a physician is consulted. Two, three, four, or half a dozen flannel or

woollen garments are found to cover the child's chest; while, perhaps, when brought to the physician's office, two little feet may be seen peeping from beneath the mother's shawl or apron. If any of these coverings are transferred from the chest to the feet, with instructions that the latter be more carefully protected, the reply usually is: "Oh! sir, there's nothing wrong with the feet; the trouble is all there," pointing to the chest: and before the mother faces the cold again with the little one, the articles will have been restored to their original places. A single covering is left to the feet; and the remainder to the parts which required it less—to swell the bills of mortality. Many thousands are annually sacrificed in this way; and in point of treatment, the best selected remedies are valueless in such cases. We know with what disregard of consequences old country persons of the humbler classes expose their nude feet. How many cases of intractable bronchitis, pleurisy and pneumonia are the result! and how many thousands will yet fall victims ere persons learn to appreciate the difference between a Canadian and an European climate!

It requires time for the immigrant to become acclimatized; but immigrants, without the immunity conferred by acclimatization, are slow in learning that they are no longer in a country where children can be exposed with nude feet and legs to a temperature to which they, in their infancy, were unaccustomed; and slow to recognize that a lengthened residence confers a certain adaptability to the qualities of a climate which can neither be modified nor changed.

But if exception be taken to the often insufficient protection of the feet in cold weather, exception must be taken to the excessive warmth of head-gear worn at that season. Again, the *habitants'* covering is light and porous, and the head is sufficiently covered and warm and, at the same time, *dry*. The British Canadian covers his head

with fur, rendered impervious in its preparation by the tanner. And this is lined with cotton batting; and that again with farmers' silk, and his head is kept hot and *moist!* Should the wearer get what is erroneously considered "a cold in the head," and he can hardly escape it, he adds to the thickness of his covering. While insensible transudation is taking place from every other part of the body through its pervious covering, it is only when the cap is removed that cutaneous exhalation, now clustered perhaps into drops, can escape. And in the process of evaporation the temperature of the surface is quickly reduced, forcing the proprietor of the fur cap to replace upon that part of the body, which is already protected by nature, a covering which it did not require. A lighter head covering may look uncomfortable, but it does not feel not so. A most comfortable, and most sensible head covering even for very cold weather was that worn by Dr. Kane: a tiara of fur which left the entire poll bare to the elements. This protected the face, ears and forehead against the severe cold of the arctic regions; and when he reached his cabin there were no dewdrops, as with his companions, to evaporate, or to quickly freeze, according to the temperature.

Heated air within our houses in winter—where a temperature sometimes reigns as high as in summer—is a constant cause of debility and sickness. In some of the smaller houses—stocked with living beings—one wonders less at the degree of cold they can endure without, than at the heat they can absorb within their dwellings. I have not unfrequently noticed a difference of 80 degrees of Fahrenheit separated by a two-inch door-frame! The breathing of air so heated, and necessarily so impure, within doors, does away in great measure with the tonic influence of the cold air breathed without. How the body can withstand those great and sudden changes can only be explained on the hypothesis that the contact of cold air blunts the sensibility of its surface in the first

instance; and a high temperature is less sensibly felt in consequence.

The mucous membranes of the air passages, however,—of the nostrils, windpipe and bronchial tubes,—are not so blunted in their sensibility, and abundant mucous and muco-purulent discharges are evidences of their irritation.

This is a matter of great practical moment. I believe that the coldest weather which may occur in any part of Canada, when undisturbed in its influence by heated air on the one hand, or much wind on the other, is incapable of producing the slightest catarrhal or chest affection, of an irritative or inflammatory character, in persons properly prepared to meet it. In this assertion I am fully sustained by Dr. Rae, who had many years experience in the north, when in search of Sir John Franklin. Dr. Rae states that during his continued sojourn in regions deemed inhospitable—where (as with the Esquimaux) the thermometer was often, for many weeks at a time, 40° to 45° below zero—where no fire was used—where the only water they had to drink was snow dissolved by the heat of their own bodies—he *never heard a person cough*. Old Norwesters residing amongst us tell us much the same thing. The Esquimaux, it may be observed, notwithstanding the intense cold of the extreme northern portion of this continent, "never think of fire as a means of imparting warmth." And it has been observed by travellers that they do not approach fire made for cooking purposes, the heat from which, the whites, and, still more, the Indians, absorb with relish.

At Melville Island, where, according to Parry, mercury freezes during five months of the year, the sailors had good health; and in the bay of Winter Harbour, the crew of the *Hecla* and *Friga*, when properly protected, could expose themselves with impunity, provided the atmosphere was still. The cold at the time was so great that hot water, allowed to fall from the top-mast, reached the deck as hail·

Mercury could be fired as bullets from fowling-pieces; and balls of frozen almond oil, when fired against planks, pierced them and fell to the ground unbroken.

That severe cold is not prejudical to health, I may instance the fact, that four-fifths of the Honourable Hudson Bay Company's servants, being Scotchmen, are generally reckoned, as among the hardier, more active and more enterprising of the Company's servants. They often endure hardships which, to many, would seem almost incredible—spending months without seeing the inside of a house—going to sleep at night in the most sheltered spot they can find, wrapt in their cloaks and a blanket. "Parties of them," says Murray, "have spent whole winters on the banks of rivers, or lakes, where their only sustenance was the fish drawn from the waters, without bread, vegetables, or any other article." Yet their hardships are borne with cheerfulness, enlivened, no doubt, (they are nearly all Aberdonians) by the prospects of "siller"—a commodity said to have attractions even for those more southward. When these *factors* or *voyageurs* come to reside amongst us in cities, they overflow with a health of which a change in their habits too often soon deprives them.

It may be gathered from the recitals of Kane, Hayes, Richardson and others that cold—far more intense than anything we experience in the more settled portions of Canada—is quite consistent with, nay is even productive of, the best health. We must look, therefore, for the causes of the inflammatory affections of the chest, not to the dynamics of our climate, but to the incautious and injudicious manner in which the non-acclimatized meet it.

It is difficult to furnish from amongst ourselves evidences of the immunities which acclimatization confers upon the human species; but in the Animal Kingdom they are abundant. As instances, I may mention that in the epidemic of pleuro-pneumonia which, some years ago, carried off so many fine cattle on the Island of

Montreal, it was observed that the newly imported animals were chiefly the sufferers. Mr. Fallon, of Lower Lachine, lost many newly imported ones—while of those thoroughly acclimatized, *not one* was affected with the disease. The same gentleman having introduced a number of Leicestershire sheep, he took the best care of them; fed them well; and the Canadian sheep shared but partially in the good treatment. The latter did well; but large numbers of the former perished at the yeaning season. Mr. Masterman, an unusually intelligent meat-dealer, had already observed that adhesions are comparatively rare among acclimatized or native animals, but frequent among the recently imported. He informs me that on one occasion he killed thirty or forty imported sheep which had been mangled by dogs, and found pleuritic adhesions in most of them. Is it then to be wondered at, that the non-acclimatized among ourselves require a care and a forethought which might be deemed unnecessary to the children of the children of the soil? No hospital physician; no observant practitioner, would find difficulty in answering in the negative a question already disposed of by the vital statistics of the country.

Variations of heat and cold, when within certain limits, strengthen the inhabitants, and render them more active than those of uniformly cold or of uniformly warm climates. But the effects of cold on an unprepared body, even when those effects bear not in a sensible manner on the exterior, may act with violence on the interior of the animal machine; upon the animal spirits; and upon the vital fluid pent up within its frame. It is necessary, therefore, to preserve those variations within certain limits; and, while moderate changes of external temperature are desirable, variations of heat and cold produced by change of clothing are not to be sanctioned.

It is not infrequently noticed that in the spring many lay aside their winter clothing too early; and for their imprud-

ence have often to resume it again till several weeks later, when they are less prepared for the temperature which succeeds

A question suggests itself: How should persons clothe themselves in winter? and the answer simply is: not always too warmly, unless constantly exposed to a low temperature. But as we habituate ourselves to much—too much—artificial heat; warm sitting—and worse than all—warm sleeping apartments—both of which diminish that proper irritability of the surface, so indicative of, and so conducive to health—our garments should correspond somewhat with the temperature: light and pervious within doors; thicker and less pervious without.

The Russians are circumstanced, as to cold, much as we are, and dress lightly within doors, not even wearing flannel next the skin. But with linen shirt and drawers; with wide trousers and wide boots; and with the national sheepskin body-coat or *tooloop* outside, they are comfortable. They go without the latter indoors; with it, when exposed to cold. The Esquimaux cannot clothe themselves too warmly when on their journeys; nor too lightly when in their huts: the warmest fur is worn when facing the cold; but within their ice-huts they are in a state of nudity. We, in this latitude, cannot look for a like indulgence; but we might, to a limited extent, imitate both the aborigines and the Russians, in dressing less warmly than we do within doors; more warmly without.

The early British colonists much amused, by their costume, the earlier French Canadians; and Mr. Phillipe A. de-Gaspè, in his "Memoires" alludes to them in his usual laconic manner when he puts the following into the mouth of a French-Canadian: "Ces Anglais sont si eccentriques que rien ne me surprend de leur part. Nous mettons en hiver nos bas de laine *dans* nos souliers, et ils les portent par dessus. Nous mettons nos gilets *sous* nos habits, et eux les mettent par dessus."

Love of dress and the desire to appear to advantage were noticed by Charlevoix, in 1720, to obtain among the French Canadians: "On fait bonne chère, si, avec cela on peut avoir de quoi se bien mettre; sinon, on rètranche sur le table pour être bien vêtu." And in contrast he says of another nationality: "Il n'en est pas de même des Anglais, ses voisins; et qui ne connaitrait les deux colonies que par la manière de vivre, d' agir et de parler des colons, ne balancerait pas à juger que la notre est plus florissante." But Charlevoix wrote long ago. Were he to appear now, he would be at a loss to decide in which nationality is to be met the greatest extravagance in dress. The greater comfort is still, as formerly, met with in country districts, among the French-Canadians—and I should advise an approach to their manner of clothing, as well suited to the climate. But extravagance is met with equally in both—an extravagance often beyond the power of husband or parent to gratify; and which, I fear, it would be useless to condemn.

Food.—There are in every climate two, and but two, purposes to be subserved by food. One: to build up the fabric of the body; the other: to sustain its heat. Whatever be the kind or quality of food taken, no other healthy purpose can be promoted by it.

As it is from the food we take that all the tissues of the body are formed, it is a matter of some moment to know in what respect our mode of living is suited to the requirements of the animal economy.

Food, and especially flesh, is so abundant in Canada, that nowhere amongst us are there imitators of the Hindoos or Arabs, who live, and are strong, on rice and dates; or of the old Roman soldiers, tall and erect, on barley-bread and sour wine; or of the Spanish peasant, powerful and agile, on apples or water-melons and bread; or of a Chryostome and others, healthy and content on bread soaked in water, and herbs.

The extreme frugality of ripe summer climates in the eastern world is almost unknown in Canada. The Hippomolgi "justest of mankind, on milk sustained and blest with length of days," may here find counter-parts among the Carmelite nuns in this city, but not elsewhere in our land. Even the bread and apple-eating Spaniard; the maccaroni and olive oil eating Italian; the schwarz brod and grape eating German find few imitators here; while food of a too stimulating quality, and in excessive quantity, is taken to swell the large list of dyspeptics.

In summer, spring, and early autumn, the kind and quality of food required differ little from what are used in like climates in Europe; unless it be that flesh of all kinds is here used in greater abundance.

In spring-time in Canada, lesser quantities of salt meat are eaten, supplemented with bread, eggs, and such vegetables as have been preserved throughout the winter; and large quantities of milk in every style—fresh, skim, sweet, sour, thick milk, buttermilk, curds and whey, with cheese and butter. These, in country districts, suffice to sustain animal strength during the long and fatiguing hours of labour.

It is not till summer is well advanced, that fresh vegetables, fruits and berries are in sufficient quantities to enter largely into consumption.

As autumn advances, however, and the oblique rays of the sun become less sensible, the pinch of appetite to wholesome food is more keenly felt; no "gew-gaw pastry can satisfy him now." This is the "killing season," when the fat of all kinds yield their predial juices to man's keener desire of food.

Our winter climate requires generous feeding; but it impels at the same time to physical exercise. Our winter work and winter sports in the open air are all appetizing. The quantity of fat carbonaceous food which is consumed by persons exposed to a low temperature—exorbitant as

it may appear to the denizen of a temperate clime—is rather a necessity of their peculiar life than the result of gluttony. As the winter advances, and as we proceed northwards, even the fattest animals are not too fat for food. Far north the narwhal is more heat-making than the seal; while the fat bear is "stronger travel" than all; and Hayes, from whom I quote, says: "blubber becomes a constant companion whenever it could be got." Still further north, raw blubber, or frozen walrus beef or liver are most valued, and the natives prepare themselves for a long journey in the cold by a course of frozen seal. The liver of a walrus, says Hayes, eaten raw with slices of his fat "of a verity it is a delicious morsel. Fire would ruin the curt pithy expression of vitality which belongs to its uncooked juices." I once feasted, as I have never feasted since, on fat raw pork. Lambs' roast pig,—which to read about stimulates the secretories of the mouth,—is tame and insipid in comparison.

"No people," says Simpson, "so soon get tired of any particular diet as Indians; and their longings for change, even amidst the best cheer, are often truly ridiculous. The flexibility of their stomachs is no less surprising; at one time they will gorge themselves with food, and are then prepared to go without any for several days, if necessary. Enter their huts; sit there for a whole day, if you can, and not for an instant will you find the fire unoccupied by persons of all ages, cooking. When not hunting or travelling, they are, in fact, always eating. Now it is a little roast; a partridge or rabbit, perhaps; a tidbit, broiled under the ashes; anon, a portly kettle, well filled with venison swings before the fire; then comes a choice dish of curdled blood, followed by the sinews and marrow-bones of deer's legs, singed on the embers. And so the grand business of life goes unceasingly round, interrupted only by sleep."

Allusion is frequently made to the North American

Indians, and to the gormandising feats they exhibit when visiting any of the stations in the north-west. I have already spoken of them. These would seem to favor the belief, so often expressed, that they are commonly enormous eaters. But comparatively speaking, this is erroneous. There are no persons on earth, says Catlin—who lived much among them—" who practise greater self-denial than the men do ; who are constantly in war and in the chase ; or in their athletic sports and exercises ; and for a great part of their lives enforce the most painful abstinence upon themselves for the purpose of preparing their bodies and their limbs for these extravagant exertions." His lordship, Bishop Lafleche, of Three Rivers, for many years a missionary amongst them ; and Mr. Geo. Barnston, for the greater part of his life in the Hudson Bay Company's service—both the highest authorities I could quote in this connection—agree in that opinion. My own personal knowledge is in accordance with theirs. I quote their letters in full elsewhere.*

When the expedition under Mr. Patterson set off from Dr. Kane's imprisoned brig, it took one barrel of parboiled pork ; half a barrel of raw ; fifty pounds of boiled beans ; five barrels of bread ; fifty pounds of coffee ; and five of tea. This was supposed to be the smallest quantity that would suffice nine men for a month, reduced by necessity, and the means of transport (an open whale boat, 24 feet in length, 2½ in depth, and width ; 5½ feet beam) to the smallest quantity ; besides trusting to chance for game to supplement it. Even this necessarily limited quantity would appear large ; but it is moderate in comparison with what is consumed when the appetite is unrestricted.

But I am travelling very far north, as the broad extent of our country enables me to do. To return, however, to the milder and more settled portion of Canada, of which Quebec, Montreal, Toronto and Ottawa are centres ; those

* See Appendix H.

who live much within doors, and where there is much,—too much—artificial heat, necessarily assume regular habits in, and regular hours of eating, drinking and sleeping. They are without one of the stimulants to the use of much fat meats—external cold. Among the residents of towns and villages, therefore, where every variety of food can be easily procured by purchase, we do not notice those wide departures from European customs which are met with in the back woods, and on the borders of the lakes and bays. There we see the gastronomic powers of the shanty men and *voyageurs*—and are astonished at them. But not often have we seen the severe labour they perform; nor experienced the inclemencies to which they are exposed.

It is not easy to state what quantity of food is consumed or wasted by each person in Canada; but the quantity is quite equal to what is disposed of by any equal number of civilized people anywhere else. Following certain occupations, however, there are men, strong and hardy, who are cut off from all supplies of food, except such as are furnished as a daily allowance, and the quantity they dispose of may be easily arrived at. The shantymen—raftsmen, axemen and teamsters—are of this class; and to them I shall come shortly.

All through the northern portions of Canada, I am assured by Mr. E. M. Hopkins, the companion for many years of Sir George Simpson, and his successor in the service of the Honorable the Hudson's Bay Company, the food consumed is very large indeed. In the Arthabaska and Mackenzie River countries, and also in several detached parts, the staple food is fish. In the Saskatchewan country, the food is chiefly buffalo meat, a man and his children eating eight to ten pounds a day—equalling about two pounds a head—the man's share two to three pounds. In the southern part of Hudson's Bay, it is usually salted geese (Wavey, Outard). The *voyageurs* from Quebec and Ontario are rationed exclusively with

pork and biscuit: about 1½ lbs of each, or 3 lbs a day; besides sugar, *ad libitum*. In the interior the *voyageurs* are fed on pemmican,* one to one and a half pounds. Where fish can be had, a favorite dish is the "tiaude," made of alternate layers of fresh codfish and lard. On Fridays, butter is substituted for the latter. *Crêpes* are another favorite dish, and the quantity of those indigestible things one man can eat is truly astonishing.

In long journeys, it is necessary to ration the men as above, and when wild fowl and other game are met with, they are indulged in as extra fare, and do not count in the daily allowance. The French Canadians, Mr. Hopkins tells me, eat decidedly more pork than the British—the latter like a variety, and get sooner tired of pork and biscuit.

On the steamers on the St. Lawrence, Ottawa and upper lakes, and in the service of the Richelieu Company, the quantity consumed is thus averaged.† Mr. Duncan Macdonald, builder of the Montreal, Ottawa & Occidental Railway, gives like evidence.‡ Lieut.-Col. Harwood, who is very familiar with the question, furnishes like testimony.§ Mr. W. L. Egar, Pork Inspector, bears evidence to the same.‖ Mons. de Gaspé, the brilliant and pleasing writer of "Les Anciens Canadiens" and other works, without going into details, speaks in a similar strain.¶ Dr. Mount, who passed most of his life among the *habitants*, corroborates, in an intelligent manner, the statements of others.**

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* *Pemmican* consists of the fleshy parts of the deer, cut into large slices, dried in the sun, pounded and mixed with boiled fat. Like all other meat, it is better by being seasoned, though the Indians prefer it without salt or any other condiment. It is the staple commodity of the northern *voyageurs*, who eat it cooked in any way the readiest, but all agree that, when hungry, it is not unpalateable "cold with water." A whole buffalo produces about 100 lbs. of pemmican.

† Appendix A. ‡ Appendix B. § Appendix C.
‖ Appendix D. ¶ Appendix E. ** Appendix F.

I should not have dwelt so fully upon this part of my subject had it not pleased a writer—not over particular as to his choice of language—to call in question my statement before the International Medical Conference in Paris as to food. Mr. George Barnston, in November, 1867, when asked by the then editor of the *Canada Medical Journal* what amount of pork the *voyageurs* consumed, replied: "About 3 lbs. a day." Dr. Rowand, of Quebec, who was born in the North-West, who accompanied Sir George Simpson in his famous voyage, who knew the habits of the people intimately, and to whom I mentioned this opinion, says:—"I know no one in the country more competent to give you correct information on the subject than Mr. Geo. Barnston; and the quantity he has named appears to me to be very reasonable. In my voyages with Sir Geo. Simpson I have often seen this quantity greatly exceeded—not in pork, for we could not get it, but in other kinds of meat." Another statement, and I have done with this part of my subject:—Capt. Monarque, in the service (1867) of Sincennes, McNaughton & Co., states that he passed the winter of 1847 in one of the shanties of the Hon. R. U. Harwood, and that twenty-nine men, himself (Monarque) being one, ate, on an average, a barrel of pork, weighing 200 pounds, in three days. This would give, in round numbers, 2⅓ lbs. a day. In very cold weather, he says, they could with difficulty forbear breaking the second barrel before the end of the third day: "mais on pensait," he adds, "que la quantité ci-mentionnée était assez raisonnable." Mr. Charles L. Belanger, a name now anglicised into Baker, an intelligent French-Canadian packer at Lindsay, Ontario, tells me that but one and a-half pounds suffice for a lumberman in that neighborhood per day when the pork is fat; but, when lean, a half pound more is used—but the lean is not always eaten.

Dease and Simpson, in their descent from Athabasca to the Polar Sea, found that the union of flour with the

pemmican produced a saving of one-third in the consumption. "Three pounds of pemmican alone," says Simpson (p. 96) "form a man's daily ration; but, though the food is highly nourishing, it soon becomes distasteful and cloying. With the flour it makes an excellent soup, or rather 'burgoo.'" It was found, at the end of the journey to which I refer, where this food was used without restriction, that "the average daily consumption had been exactly two pounds per man," supplemented occasionally by game.

In Canada, as in the northern United States, food is taken by all classes in larger quantities than the wants of the system require. It is an error to suppose that because Englishmen often speak more about the table and its pleasures that they eat more. That is not so. He does not eat more; he eats better, though he may swallow less. The Englishman may, and does, talk more at, and of, the table; the American [and, to a certain extent, the Canadian] is too hurried to talk, and in silence pours down food in greater quantity than is needed, and usually unprepared by ensalivation, before the sensation of hunger has had time to be appeased. As food is taken altogether too hurriedly, and in larger quantities than the power of the stomach can dispose of, irritation of its lining membrane results, and other systematic disorders follow. Hunger is, in health, the general criterion of the power to digest; but with us, too commonly, the uneasy feelings of the dyspeptic usurp the place of this normal regulator; and the patient, mistaking those uneasy feelings for hunger, introduces more food, instead of allowing the needful rest.

Those who are acquainted with the intimate relations which exist between the nervous and digestive systems can best appreciate the importance of not disturbing the harmony.

It would seem to be natural that a people emigrating

from a country where laws and customs are well established ; where the habits and usages of society are well matured by time, would retain what is good, and endeavour to improve upon it. But changes in circumstances are often so rapid with us, that with food, as with other comforts, extravagance would seem to be indulged in to the serious injury of health.*

Dyspepsia, formerly so rare amongst us, is now most common : not yet so common, indeed, as in the adjoining "Union"—where whole populations of some cities look as if disturbances of the digestive organs were universal—but still common enough to make us enquire : Whence this trouble ?

Should these pages be read by those who have been accustomed, while in Europe, to a sparingly animal diet, they are strongly advised not to discontinue, on their arrival here, their good old country custom in that respect. Let not too much meat be taken, nor fluid of any kind, while eating, otherwise these, and not the climate, will rob them of their color, diminish the clearness of the eye, and give sallowness to the cheek.

But it is not the quantity alone that is objected to, but the quality also. The quality of the food consumed is too rich, too stimulating, as if every variety were introduced to "spur beyond its wiser will the jaded appetite." Most of the people of Canada fare not only well, but sumptuously and extravagantly. Their circumstances would

*Formerly in the Hudson Bay service (and I allude to this service frequently from the circumstance that any information from that source is always reliable), tea and sugar were used only by a few of the more favored higher officers. These were called "luxuries," and were the only ones. Tea, however, seems to have become an indispensable condiment; and tea kettles are necessary appendages to every *voyageur's* fit out. But as hunger, with the *voyageur*, is keener than thirst, tea is used by those, who are in health and high spirits, as a pleasant beverage, and not, as with us, to create an appetite. Liquors of all kinds are excluded when practicable.

seem to warrant it; but nothing could warrant the consumption of saleratus colored pastry, pudding, pies, pickles, hot cake, and the hotter tea and coffee, which are swallowed with the food. In a more primitive state, quantity and quality would be regulated by desire and opportunity. But we have passed that condition of primitiveness here, and the experience of generations would seem to be wanting to guide and direct; while the experience gained from our near neighbours would seem to be insufficient to guard and deter.

But it may be thought, and it is often stated, that this climate forbids all attempts at an approach to an imitation of the frugality of some European countries. As evidence of the contrary, the food of the Russian, similarly circumstanced as to climate as we are, is extremely simple in comparison with ours: rye bread, slightly sour; soup; curds; and milk whey, with farinaceous dishes form his dietary. Meat is used but seldom, and in quantities at a time which would be considered hard usage here. I may also mention—not for the purpose of imitation, however—that the members of the order of Carmelite nuns, established in Montreal in 1875, abstain from meat the whole year, except in cases of sickness. During the lenten season, which takes in the whole winter, (beginning on 14th September, and continuing without interruption till Easter), eggs, butter and milk are also forbiden; and food is taken sparingly, with oil, or salt, and water. The first meal is at eleven; and the second, which is a light repast—sufficient to tantalize the palate—is at six. This mode of living—which has long been in practice in France—is continued here, with no additional discomfort thus far, as stated in the narrative from which I glean:—"Elles les pratiquent aussi facilement en Canada qu'en France, sans que la rigueur du climat les oblige à rien relâcher ou omettre." And this severe regimen is borne, not alone by french stomachs, for the narrative continues:—

"Les jeunes Canadiennes, admises parmi elles, s'habituent sans difficulté à ce régime sévère. Elles sont étonnées du bien être physique qu'elles éprouvent au Carmel." The time is yet too short to enable us to say if this severe regimen can be continued.

The same experience was gained some years ago near Quebec, by a body of Trappists; and one of these gentlemen, now a clergyman on the Island of Montreal, in answer to certain questions, writes me: "Les Trappistes du Township Langevin (Québec) ne se nourrissaient que de légumes, tels que choux, fèves, patates, etc. Et malgré la rigueur du climat, ils pouvaient soutenir à ce régime; faire leurs travaux, parfois durs et pénibles; et suivre toutes les observances de leurs Règles. Cependant, en fait de nourriture, ils n'avaient pas toujours même ce que la règle leur permettait d'avoir: c'est ainsi que leur pain était ordinairement très mauvais et très mal fait. Ici, à cause de la rigueur du froid, ils se servent de feu, mais trop modérément pour ne pas souffrir même parfois beaucoup.

P.S.—Aux légumes, après leur long carême, les Trappistes ajoutaient de l'huile, mais jamais le beurre."

The frequency of eating is of considerable importance; and the meal hour has more to do with our health than may at first sight appear. Perhaps some practical expedient might suggest itself by what is observed in two very different climates, each, however, having its exact counterpart at certain seasons in certain parts of the Dominion. In the extreme north of this continent, the only meals are breakfast and supper,—for dinner, as Simpson observes, that word of power in other climes, is unknown at Fort Confidence. So much for the cold weather. Per contra, Lord Elcho, in the discussion, in the House of Commons, of Army Estimates, refers to a question affecting the health of the troops in India; and from a correspondence between a general officer, who had seen much ser-

vice there, and the Commander-in-chief, he concluded that the hour at which the troops in India should have their dinner had considerable bearing on their health. The General Officer found that, when at a most unhealthy station, the troops had their usual mid-day dinner hour postponed to three or four o'clock—a cooler part of the day than their previous dinner hour—the men did not suffer to anything like the extent they did in other circumstances.

If I take exception to the large quantities of food used, I must equally protest against the habit of rapid eating now becoming so common. A volume could be written on this subject. To this habit, more than to any other, is to be ascribed the changed appearance of certain Europeans after a residence in America. Disorders without end of the digestive organs are the result of this habit. It is, moreover, a most frequent cause of death, although not appearing in our statistical tables. Disorders of the digestive organs give rise to disease in other and remote organs; and death is attributed to the proximate cause and registered accordingly; while the remote disturbances of the digestive functions pass unheeded. How frequently do children die of head affections; and adults of hepatic and intestinal affections, which had their origin in disordered stomachs.

It is scarcely necessary to allude to

Intemperance.

as a source of disease. Less temperate, as we are, than the French or Italians; more temperate than the English, Irish and Scotch, we, living in this climate, have a greater necessity for the observance of temperance than have persons of those nationalities. Every traveller who has considered the subject, agrees in the necessity of avoiding stimulating beverages. The climate itself is stimulating, as I have already observed, and stimulants, which, in Great Britain, might be taken with impunity, and sometimes with advantage, are here productive of mischief.

But there are other circumstances besides climate which here render drinking habits so pernicious to health. As this is a new country; and as preparations containing alcohol are generally new, when used, they are, in consequence, more mischievous. The baneful effects of new products of distillation are greater than are those of older products. The softening changes of age are required to develop the ethers and to destroy the fusel. It is observed in Canada that hard drinkers soon pass away.

In hot weather, the use of stimulants increases the exhalation from the skin, and should, in consequence, lower the temperature of the body, at a time when lowering its temperature would be really agreeable. But this exhalation leads to debility by carrying off more than is necessary; thirst is again induced, and allayed again for the moment; but the forced exhalation increases it again. Dr. Moseley, speaking of a climate much warmer than our summer climate, says:—Those who drink nothing but water are but little affected by the climate, and can undergo the greatest fatigue without inconvenience.* To the same circumstances the observant Combe drew attention when visiting this country.

The Hon. Arthur Gordon,† in writing of New Brunswick and of his experience in the forest there, says: "A total abstinence from all spirituous liquors makes the whole difference as to comfort on such excursions. The slightest use of them makes the assaults of the black flies and other noxious insects a serious torture instead of a matter of comparative indifference; and the great parties

* "Notwithstanding the overwhelming evidence in favor of temperance in hot climates, the military authorities of our Indian Empire," says the London *Medical Times & Gazette* for February, 1878, "still, we believe, serve out a daily ration of rum (four ounces) to the European troops under their control. Reports against the practice have from time to time been made by many members of the Indian medical staff, but apparently without effect."

† Notes of Travel in 1862-3.

of wood-cutters or lumberers almost invariably confine themselves wholly to tea whilst in the woods." "I am afraid," he adds, "on their return to the settlements they too often indemnify themselves for their enforced temperance."

But if stimulants do not keep out the heat, they must surely keep out the cold; "and a strong frost," the Ettrick Shepherd says, "brings out the flavor o' the speerit in a maist surprising manner, and gies't a mair precious o'er the haill room."* These are among the claims set up by those who seek an excuse for their use. It is scarcely necessary to reiterate before an intelligent audience, that however little excuse the denizen of a summer climate may have for favouring an indulgence in stimulating beverages, the residents in cold climates have no better. Every traveller recognizes, not alone the desirability, but the necessity for the strictest temperance in those who would bear exposure to a low temperature with impunity. "Abstinence from all intoxicating liquors, except when dispensed by special order" is an accepted rule with the commanders of expeditions, and the valued testimony of Doctors Kane, Rae, Hayes and others is fully confirmatory. Dr. Rae, when laying in provisions for his expedition to the Arctic Sea, took pemmican, grease and flour, and alcohol for fuel, with tea and chocolate; but only four gallons of brandy and two gallons of port wine for *medicinal* purposes:—for his experience in the North had taught him to be "well aware of the bad effects of spirits in a cold climate."†

All observant travellers agree that the use of wine and spirits renders the body less able to resist external cold.

*Noctes, Ambros, p. 148.

†Dr. Kane in his second Grinnell Expedition, with the experience gained in the first, imposed but three laws on his officers and crew: (1) Absolute subordination to the officer in command or his delegate; (2) abstinence from all intoxicating liquors except when dispensed by special order; and (3) the habitual disuse ofprofane language.

It has more than once been noticed that to the use of brandy might be imputed the appearance of scurvy in its malignant form. Ellis noticed this in the voyage to Hudson Bay; and Chambers says: "the spirits are not now served out, it being supposed that the use of them is conducive to scurvy."

If, in the qualities of our climate, I can find no excuse for the free use of stimulants,—but much against it,—I cannot be far astray, in saying to every resident in Canada, as Hector did to his mother when she pressed him to drink and be refreshed:

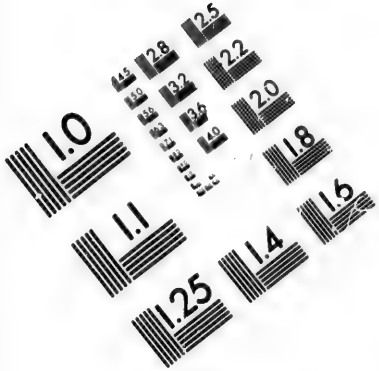
> Cheering wine!
> Bring none to me, lest I forget my might.

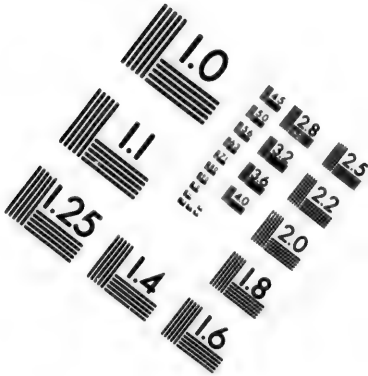
The words of the besieged and fatigued Trojan should be the motto of every dweller in this dry and stimulating atmosphere who desires to preserve his health.

An evil scarcely less pernicious than drinking is that of immoderate

Smoking.

The mode of smoking in this country is different from what it is in Europe. Here it is begun at an earlier age; and, by practice, the power of using the strongest tobacco is soon acquired. The smoker here smokes before business, during business, after business; not furtively, but openly. Anything under twenty is, in Great Britain, considered young,—too young to begin the habit which, as *Punch* says, gives the "pimply cheeks and tallowy complexions of the young short-pipe sucking fools" who meet us everywhere, and who "put out of time their organs of digestion because they think it 'manly' to be seen able to smoke." The mode of smoking in this country is far more injurious than is that followed in Europe. The appendage to the smoker's armamentaria—or rather, to the cleanly housekeeper's means of protection—is not commonly required in Europe, where expectoration is *not* considered a necessary accompaniment, and where





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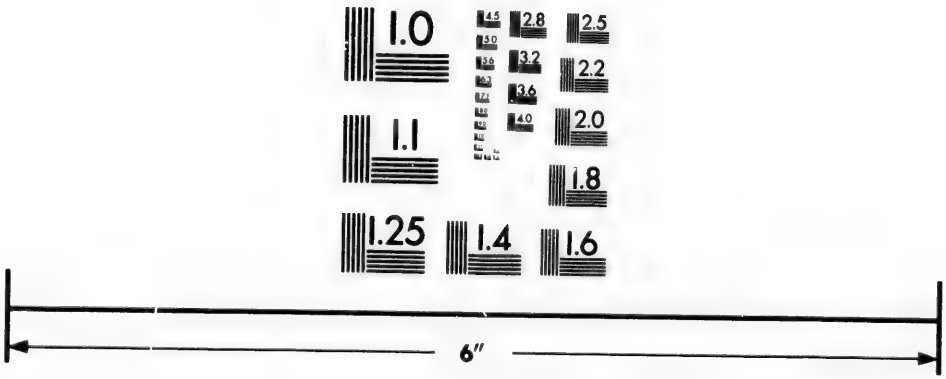

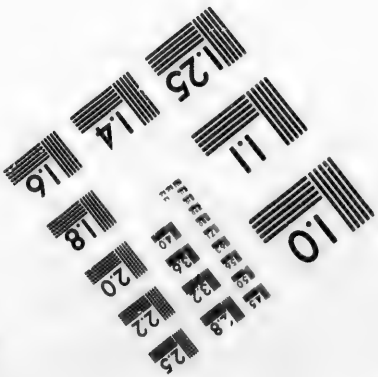

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the equally hurtful and disgusting habit is not usually indulged in.

It might not be inappropriate to allude to the habits of the people with reference to

Physic,

though the influence in that respect might be deemed limited in extent, and inconsiderable in importance. It may be stated, in general terms, that as the chief complaints of British Canadians are of the chest; and those of the French-Canadians are of the stomach and abdomen, the former frequently use expectorants, and the latter are much given to the use of drastic cathartics. The latter prescribe for themselves periodically, unless their physicians will do it satisfactorily. Large numbers of persons in cities flock to hospitals and dispensaries; diagnose their own complaints as arising from constipation or bile; and ask to be well purged. Physicians in country districts tell me that a brisk purgative is a necessary preliminary other to treatment. Without the prefatory cathartic, confidence cannot be retained. In some diseases—fevers, for instance,—the practice of purging cannot be otherwise than pernicious. It is astonishing the large doses a person will take before admitting he is "bien purgé." The dryness of the tissues has much to do with this tolerance of cathartics; and many physicians are of opinion that the doses recommended in the pharmacopœias of Great Britain and France are too weak for persons inured to this climate and its more abundant food.

The native Indian, however, is an exception; and to him, living on the simplest food, and having diseases of the simplest inflammatory character, medicines do not require to be administered in such large doses. Bleeding is said to be well borne by him.

The African settlers in Canada, as everywhere else, bear neither venesection nor large doses of medicine. Whether diseases are modified by introduction into their

system, or whether the climate diminishes the *vis medicatrix naturæ* in a people destined for a more sunny land, it is difficult to say; but medicines of all kinds are badly borne; and the mortality among them is greater than among the Caucasian variety of the population.

Narcotics are not, it would appear, equally well borne here in winter and in summer. They seem to possess more energetic properties in warm seasons; and in winter are less active here than in Europe. This modification of the action of narcotics in certain seasons is not solely due, as one might suppose, to the active powers of the remedy being directly influenced by climate (for the drugs used are chiefly from Great Britain, and it is barely possible that a short sea voyage could affect them); but is no doubt, in great measure, due to climate, which, as Dr. Paris wisely observes, "not only modifies the powers of a remedy by influencing its structure and composition, but renders it more or less active by increasing or diminishing the susceptibility of the body to its impressions."*

As I have more than once hinted at during this paper, diseases are modified by the circumstances which surround the patient. But here in Canada, while the social condition undoubtedly possesses a certain influence, it has a less influence than has nationality upon the effects of remedies. This I have particularly noticed with reference to narcotics, which seem to act upon the American Canadians—the chief sufferers from nervous disorders—with greatest potency.

Ventilation. — The imperfect ventilation of the houses is a prolific source of discomfort as well as of disease. Those chiefly of the poorer classes, and in too many instances also of the richer, are constructed with an eye solely to warmth; and when the outer windows are put

* In confirmation of this hypothesis he adduces the well-known effects of perfumes: many of the Roman people being "unable to sustain the strong scent of flowers without experiencing a sensation highly oppressive, and which in some cases is even succeeded by syncope."

up in winter, and the seams and chinks are closed, no other channel is offered for the ingress of pure, or the egress of foul air than the door, when opened. The air within is sometimes unbearable. When disease appears in such houses it is severe: small-pox is nearly always confluent; scarlatina assumes the more malignant type; and measles commonly manifest some bronchial complication. It is only within comparatively few years that attention is being directed in Canada to hygienic laws in this regard.

Exercise.—I shall have time to say but little under this head. When persons are in the process of acquiring wealth, they generally take too much exercise; when wealth has been accumulated, they usually take too little. The wealthier classes, and especially those who have become quickly rich, would seem to have acquired a contempt for exercise. The men—yes! and the women, too—who, when engaged in business, found no fatigue too great, now find the easy motion of an easy carriage sufficient. The result is visible in their faces—they soon

"Grow sick and damn the climate."

Yet no climate, perhaps, in the world, permits a greater amount of exercise than our cold northern region.

If the climate of Canada is favourable to health, it is chiefly by reason of its being favourable to enterprise and exertion. The labourer and the artizan have here sufficient incentives to labour to promote their health; and at the same time somewhat too much to enable them to cushion their muscles with unnecessary fat. The climate, when the thermometer is at its lowest, incites to laborious exertions of industry—making comfortable clothing and lodging indispensable. As the warm season is short, though severe; and as the changes in vegetation are rapid, efforts are proportionately great for the supply of the former, and for the preservation of the latter. And

as the vicissitudes in temperature are sudden, and even extreme, incessant care and attention on the part of the husbandman make him vigilant and active, as well as laborious; and the qualities that are thus naturally impressed on this great class, the farming class, are, as McCulloch says of the people of Great Britain, through their example, universally diffused.

It may be interesting to state that, fifty years ago, the people of Upper Canada owned one horse to every seven of the population; but now they own a horse to every three of the population. This fact is a significant one. With horses so numerous and so ready at hand there is little inducement to take exercise in walking which does so much for the inhabitants of Great Britain, where horses are a luxury for the few. Were horseback exercise to be indulged in here, there would be less objection; but driving has taken the place of that healthful exercise, and that carriage-maker is most sought after who makes the strongest, lightest and *easiest* riding vehicle in which motion will be less felt. In the Red River Settlement, says Simpson, "not a man, however mean or idle, but possesses a horse, and they vie in gay carioles, harness, saddles and fine clothes."

But great wealth is not required to enable persons in Canada to avoid exercise; and to those who have resided in, or visited Europe, it is unnecessary to point out the difference between the healthful occupations of the wealthier classes there and here.

Bodily strength was so honoured by the ancients that it was hedged round as a divinity. We run to an opposite extreme, and a pallid countenance, delicate tint, and a delicate frame have come to be regarded as the offspring of mental labour, instead of, as it is, the legitimate offspring of mental dyspepsia.

There is no doubt that manly sports and exercises receive the highest encouragement among the Anglo-

Saxons, who, themselves, till the time of Henry II, when the elevation of à Becket removed their disabilities in this regard, were forbidden by their Norman conquerors the indulgence in racing, hunting, hawking, and other like amusements.

I have a word to the ladies on this subject, but shall leave to one of the gentler sex to say it. Fanny Hall, an agreeable American writer, says :—"The English ladies when going out to walk put on substantial, thick-soled shoes; and if the streets are wet, pattens; while they wrap their persons in shawls. That the care which they take of their health is not unavailing, their plump, round figures and ruddy complexions abundantly testify. They retain their beauty to a much later period, also, than our American fair ones. An Englishwoman is hardly reckoned past the prime of her beauty at thirty-five; while an American lady of the same age is considered quite *passée*. Probably the humidity and equable temperature of the climate have some influence in preserving their bloom and beauty; and something, too, I imagine, is attributable to their habit of taking much active exercise in the open air. The English ladies are great walkers, nothing being more common than for them to walk ten or twelve miles per day. I believe some of them really suspect us of affectation when they hear us complain of being fatigued by a walk of five or six miles." These remarks are Fanny Hall's. I dared not have written them, but I endorse them. Horace Greely, when in Europe, observed the same thing: that the physical development of the English woman is unsurpassed, and for good reasons: "They take more exercise than our women do."

"Until quite recently," writes Greely, "the young men of our cities, while nourishing the mind, forgot the treatment the body requires. Athletic exercises a few years ago were unusual, and literary young men, actively

engaged in commercial pursuits and professional studies, seemed to ignore the necessity of a solid caring for the mental powers. Talent and genius fostered in this way ripen too early before the time, and are lost to us before the time."

The too early ripening, and consequent too early exhaustion, of the mental powers are due, in large measure, to inattention to bodily exercise. Within the past few years, however, attention is being given to this matter; and the importance of exercise is being recognized. Gymnasiums are now being established in most of our cities and towns; and skating, lacrosse, football, snow-shoeing, golf are not now considered, as they were formerly, out of character with the more serious duties of life, but rather as a preparation for, and an adjunct to them. If I have one satisfaction greater than another it is at having, during my whole professional life,—and at a time, too, when serious people frowned disapprovingly, and shook their very wise heads—advocated and encouraged in our young men, by example as well as by precept, a love of out-door manly exercises

Education.—The training which youth receives in this country has an important bearing on the life and health and well-being of the community. I believe it will not be denied there is a greater precocity of intelligence among the children of this country, than of Europe. And perhaps the children of native American parents more generally exhibit that marked premature development. There is among the children of this country, perhaps, in consequence, a greater tendency to those disturbances of the functions of the brain, which so often terminate in ill-health. Nature gives birth in a capricious mood to this premature development; but the teachings and schoolings of the fond parent, or of the ambitious instructor,—who, as if "to curdle a long life into an hour," loads the child's memory, and excites its already too vivid fancy—

do unfathomable mischief; and if that mischief is not always at once apparent, those schoolings will certainly be attended with an earlier failure of the mental powers.

"Sunt certi denique fines,
Quos ultra citraque nequeat consistere rectum."

The severe mental labour to which children are subjected, affects them physically. Its operations, when severe and long-continued, are visible in the hurried respirations and in the rapid glow which colours the face. Metastasio, speaking of himself, says: "The nerves of my sensorium are put into a violent tumult, and I grow red in the face as a drunkard." If this was his experience, and the experience of many professional men can corroborate it, how much more powerful must be that influence on the delicate nerve-tissue of childhood.

The conservative and restraining influence which parents exert over their children is here too soon laid aside by the parent, or disregarded by the child—who is earlier taught to act, if not to *think* for himself. "Think wrongly, if you please, but think for yourself," seems to be early taught, early believed, and early acted upon; and children look back for experience on their early minutes "through the long vista of a summer's day." Whether the blame rests chiefly with the child; chiefly with the parent; chiefly with the climate; or chiefly with the altered circumstances of parent and child, may be a matter of opinion; but I apprehend that climate, while not inoperative, has the smaller share in forcing children to overstep the bounds of youth, and to leap at once into unripe manhood and womanhood more quickly than do their transatlantic cousins. The transition is sudden—unfortunately, in certain states of society, too sudden; and the beautiful spring-time of youth and girlhood too quickly passes into an early and immature summer. The soft and pliant material is far too quickly moulded into men and women,

ere that material could obtain a character of firmness or durability, whatever it may have attained of self-reliance or self-assertion.

The period of growth, of mind and of body in all animated beings, is proportioned to the period of duration assigned to them. "Men," says Lamartine, "who are to live a hundred years, continue growing till the age of twenty-five, and upwards." Many of *our* youths, thanks to a pernicious system of home education,—or an absence of it—are already exhibiting signs of decay long before that period; and many of our maidens, with a less early drain upon their nerve tissue by excitement, would not have to deplore a premature departure of freshness and beauty.

A pernicious custom is now, I regret to say, becoming general: that of entertaining children at private parties, which begin after an hour at which their forefathers and ours would have thought of retiring; when cakes and coffee, ice cream, etc., are served out to miniature men and women to regale them after a dance, and before they are transferred from heated rooms to feverish and disturbed repose. It is a custom which has a greater influence on their young constitutions than is generally imagined. "Nature will not be cozened with impunity. Whatever we detract from the period of natural sleep will surely be deducted in the end from the natural range of our existence, independently of the predisposition to disease which is thus perpetually generated."

It was otherwise in the reign of Francis I., when they were accustomed to say, not of children, but of full-grown men and women,—

> "Lever à cinq, diner, à neuf.
> Souper à cinq, *coucher à neuf.*
> Fait-vivre d'ans nonante et neuf."

The constant tension and excitement to which youth is exposed are here often succeeded, in the developed man

and woman, by a continual wear and tear of mind and body. It would seem as if there is now going on among all classes in our large cities, and chiefly among the mercantile, a consumption and a dissipation of energy greater than the supply received from the aliment consumed; and an apparent exhaustion at an earlier period than formerly. It may be said that the same influences are in operation in transatlantic cities; but this is an error. May not the rapidly acquired wealth which builds our mansions; furnishes them with so much luxury, if not with taste; procures equipages the most costly; supplies the table with so much luxury; may not all these be dearly purchased by the wear and tear of mind and body, which renders their possessors unequal to an enjoyment of them?

The answer must be in the affirmative, even with the corollary that the judicious expenditure of accustomed, or steadily acquired wealth, "influences the physical not less than the mental qualities of mankind in a marked manner, for which it procures healthful recreation and enjoyment."

I am anxious to take from climate what does not belong to it, and to give to pernicious custom—in eating, drinking, late hours and excitement a due share in the early mutilations we so frequently witness. That it is not the climate, the experience of the most casual observer will testify. Who amongst us cannot recall, among those who take more sensible customs for their guide, instances of the most durable freshness, and every other sign of continued health and vigour.

The habitual state of our near neighbours is one of much greater mental excitement than is that of the inhabitants of Canada. Our condition in this respect is intermediate between the inhabitants of Great Britain and those of the United States.

The excessive wear and tear to which I have just alluded, though chiefly, is not exclusively confined to the mercan-

tile class. The artizan works harder; while with every class of our community the hours of labour are longer and severer than in Europe. Even that class to which, in Europe, "all Governments are alike acceptable, provided they are left in tranquility," is here a 'party' class, with its newspaper as a pabulum for its leisure hours. Watching events in Europe and other parts of the world, it estimates their influence, not on the growth, but on the selling price, of their products.

The inordinate race for wealth in every class of the community is not without its influence, even upon the physiognomy of our people. It certainly does appear as if, while breathlessly pursuing wealth, sometimes clutching, sometimes missing it, that men acquire at the same time "the power of inoculating themselves with age before the time.

While writing, I am carried back, in imagination, to the home of my childhood and my early youth. I recollect the fathers and mothers of my schoolmates. They were plain, honest-looking people. I saw them again when they were old, and their children, like myself, had grown to manhood. The latter were loftier in stature, and more thoughtful-looking; sharper, keener, smarter, than their parents; but a pang of regret has more than once shot across me when I noticed that the simplicity and gentleness of expression of the parent, untutored perhaps, had not descended to the offspring. How much of this was the result of climate; how much was caused by altered circumstances; how much was caused by education—that education which is conveyed in figures, and which is often valued not for its own sake, but for what it produces?

I have dwelt longer upon the habits of society in this regard than to many of you may appear necessary in considering a subject of the nature of this paper. But the habits of a people have much to do with shortening or lengthening life; favouring or hindering disease. It is the

habits of society which interfere with, influence, and invalidate so much, all vital statistical returns; and must be duly considered in any estimate that we may endeavour to form of a climate.

Perhaps the most marked result of the habits of the Canadian people are visible in

The Teeth.

As this is a question which interests those who have, and wish to retain, those useful adjuncts to good health and good digestion, I shall devote a few paragraphs to its consideration.

The early age at which a considerable percentage of the people of Canada, and a still larger percentage of the people of the United State, lose their teeth, has induced the belief that the climate of North America exercises a pernicious influence on them, softening or fracturing the enamel,—eating into the cementum—corroding the dentine. But that belief is erroneous. If the climate is injurious to teeth, is it its summer or its winter climate? If the former, how is it that still further south, where the heat is extreme, the negro preserves his teeth till extreme old age? If the latter, how is it that in the extreme north of this continent, where the thermometer is rarely more than -40° F. for nine months of the year, the teeth are strong and sound?

Were the influence of this climate hurtful, its hurtful influence would be most visible in those who have inhabited the country for untold generations. But the Indians have remarkably strong and healthy teeth. As we travel northward, tribe after tribe possesses the most powerful masticators. The Iroquois at Caughnawaga, St. Regis and Oka have good teeth; and further northwards, northwestward and northeastwards the teeth seem to become stronger The teeth of the most northern aborigines—the Esquimaux—are most beautifully regular, and equally

strong. Toothache is unknown among them. In the more northern parts, a kind of chalky degeneration—which is painless—occurs sometimes in old age, and is considered to be of a rheumatic character.

The condition of firmness and durability of the teeth is as sure a guide to the age of an individual among the aborigines, as are the softer parts in the hands of an anatomist. When skulls are found, not alone is the condition of the sutures an index to the age of the individual, but the much or little worn teeth are equally unvarying indices. What would be the conclusion arrived at by an anatomist on an examination of the skulls of the white usurpers of the Ojibways, Crees or Hurons, on finding many of them, not with teeth much or partially worn, but sometimes without them, or with such as the dentist had placed therein? Doubtless that they were the skulls of persons who had reached very advanced age indeed, and not, as it might be, of spinsters who had not yet woven the linen which conferred upon them their title.

As it cannot be denied the teeth of many of the people of Canada—nay, even of the white population of the whole continent—decay at an early age, the question comes: Why do they decay earlier than the bones of the fingers and of the toes—which last till the end of one's existence? To me it is not surprising the teeth decay; but that, treated as they are, they last so long.

In general terms it may be said: teeth decay because there is "an impairment of function either in the individual or his ancestors." In this country the impairment of function is usually in the individual; the European parent commonly having better teeth than his progeny. But functional disturbance is here the common cause of decay, for the child of the immigrant subjects his digestive apparatus, teeth included, to an ordeal to which it is not equal, and for which it was not prepared. I have frequently observed that persons who go to the adjoining

republic for a certain portion of every season, have, as a general rule, worse teeth than have they who remain at home. The food which those consume, or rather swallow, is too stimulating, and unsuited to the economy.

Apart, altogether, from inherited predisposition—which, I am inclined to think, is not so fertile a cause as is commonly supposed—there are several causes of early caries of the teeth:

1. *Taking too much food.*—As it is only the food which is digested, and not that which is swallowed, which sustains us, persons finding themselves lean and meagre on a large, but hurriedly swallowed quantity, increase the amount, instead of masticating more thoroughly a more moderate quantity. Disturbed digestion occurs, arising from the decomposition of the imperfectly masticated food, and the disengagement of certain acids in the mouth (chiefly acetic and lactic) which act injuriously on sound teeth, but with more potency on fissured teeth.

2. *Taking too hot articles of food* into the mouth, causing them to crack and fissure. It must not be forgotten that the teeth are composed, in large part, of earthy matter; and throwing into the mouth, as is often done by children, what is too hot for the fingers, fissures and cleaves their enamel, and through these, food enters and decomposes, giving off the peccant acids which destroy the dentine in the neighborhood.

3. *Taking cold articles*, as ice-water, into the mouth, has a result analogous to the preceding. The sudden and unequal shrinking at the point of contact at the surface fissures and cracks the teeth.

4. *Taking*—in pickles, sauces and other condiments—*acids* imagined to be acetic, malic, citric or other harmless acid, but in reality containing sometimes a large quantity of sulphuric acid, which dissolves the earthy matter of the teeth, and leaves them soft and pulpy.

5. *Insufficient mastication.*—With the teeth, as with other organs of the body, exercise of their function is necessary to their continued integrity. An organ is, within certain limits, healthy in proportion to its exercise. In this country, and still more in the adjoining republic,* it would appear to be the prevalent belief that to take time to chew one's food properly is a waste—a killing of time; —and as time, in this new world, is immortal, he who kills but a moment of it in this seemingly unproductive way, kills so much of himself. Dyspepsia is the result of such philosophy; and bad teeth commonly wait upon bad digestion. When the teeth are not used, disuse leads to decay, from two causes: (1) Permitting food to lodge between and ferment around the teeth; and (2) by virtue of an invariable physiological law, that when a function is not performed, the organ created to perform it soon becomes defective from imperfect nutrition.

All things being equal, strong and healthy teeth are met with in those who use them. The teeth of the Esquimaux women of Anoatok, chewing the skin of the usuk to make the strong, pliant, durable lines—Atlunak—are evidence that use gives to their organs a strength and firmness which forbid decay. They use their teeth. No mills grind their food; no fires cook it; no salt seasons it; no cutlery carves it; but as the seal or walrus is harpooned and drawn from the water, it is eaten ere it is frozen. The women chew blubber to liberate the oil, breaking up the connective tissue which separates the globules. They are constantly chewing and preparing leather with their strong teeth. They soften the sealskin for their moccasins or boots in this way. They are seldom without some resisting substance to gnaw at when they have no better

* Professor McQuillan, of Philadelphia, attributes the contracted jaws of Americans, as compared with the broad jaws of the English and Germans, to the difference in the character of food, and to the difference in time devoted to its mastication.

occupation. And so it is with the aborigines near all the Hudson's Bay posts and throughout Canada.* They use their teeth, and hence their firmness and durability.

6. *Drinking while eating.*—Mechanically washing food out of the mouth, by fluids of various kinds, before ensalivation is completed, and before sufficient alkaline fluid has been poured out to neutralize the acid secretion of the stomach and diluting those invaluable secretions from both sources.

7. *Spitting.*—Disgusting and stupid habit—robbing the food of its first and chief chemical solvent—and leaving it unfitted for absorption.†

8. *Mistaking the purposes of food.*—These are, as already stated, but two—(*a*) to nourish the body; (*b*) to sustain its heat. But the modern system of hotel and boarding-house living gives to gluttony a license unrestrained by avarice—the only instance where one does not pay for what he commands; nor make return for what he destroys. The digestive tube, presided over by a sense of taste which is stimulated by the tricks and refinements of the gastronomic art, commonly shows signs of disturbance; and the pearl-like organs at its superior extremity, which by nature are harder, firmer, stronger than any other tissue of the body, and destined to last a lifetime, too early and too often give evidence of decay.

Speculative.

A clever but unfortunate writer has hazarded a speculation—it could hardly be called more—that were this

* Dr. O. C. Edwards, formerly of Montreal, but now at Qu'Appelle, while having much to do with the Indians, says he has never had occasion to draw a tooth. Other physicians, and among others Oblatus, says he never knew an Esquimaux—man or woman—to suffer from toothache.

† The enormous quantity of salivary section wasted in this way may be conjectured by any one passing, after a fall of snow, along a street through which men have just gone to their workshops. The once fair white snow is imbrowned with the expectorated fluid, charged with juice of tobacco.

North American continent not constantly receiving large accessions to the population from abroad, it would ultimately again revert to the red man as its sole possessor. Dr. Knox's words are these (p. 4):—Were the supplies from Europe not incessant, he (the European) could not stand his ground in those new countries—America and Australia. A real, native, permanent American or Australian race of pure Saxon blood is a dream which can never be realized." And, again: "Man cannot ever exist permanently on any continent to which he is not indigenous; cannot ever become native, true-born Americans; cannot hold in permanency any portion of any continent but the one on which he first originated." These point clearly to the author's belief that there are many cradles of the human race. To me, as to every inhabitant of this country, the first part of this speculation was entitled to some attention, for, like them, I have no desire to see the white man tomahawked by the Iroquois on his return to the possession of his hunting-ground, from which, for a season, he had been displaced; and I proceeded to test some of the effects which this climate had produced upon the people who had been longest exposed to its influence. I entered upon the work without misgivings, for I was encouraged by an observance of the influence which this climate had exerted upon the aborigines—who are large, robust, well-made, tall, straight as their own pine, hardy as the oak, indefatigable upon long marches, light of foot, courageous, grave and sober: exceeding, in all manly sports, and powers of physical endurance, the aborigines of any country, or of any clime. And perhaps I may be pardoned if I dwell at some length on that interesting but fast-receding people who, for a period too great for us to estimate, have been exposed to the constant and unalloyed influences of the climate we are considering.

It is unnecessary to discuss the question: did the aborigine come in with the quaternary period of the earth's

history or anterior to it? The man of the tertiary period is yet a problem, and will probably remain so till belief in his existence is at an end; but the man of the quaternary period is no longer conjectural.

Dr. Robertson asserts that America was first peopled from Asia by Behring's Straits. That the Esquimaux originally spread from the West there is no doubt; while a tradition exists among their neighbors, the Loucheux, that their ancestors migrated from the eastward across an arm of the sea.

Should, as has been by many conceded, the aborigines of this continent have been descended from the Egyptians.* it must be admitted that the long operation of climate ha. not stunted them nor hindered them in their growth, but has developed a race vastly superior to their progenitors.

But, for the moment, it is unnecessary to go further than to state that they are here and to be dealt with; and that they have been here for untold centuries, receiving in all its unresisted force, the effects of our climate. How are they affected by it?

The stature of the native red man is generally much above

* As an argument in favor of the N. A. Indians having an origin other than Egyptian, it may here be observed, what perhaps is not generally known,—that the canoe, now used by the Aborigines, cut out of a huge elm or pine, is exactly like, and paddled in the same way as, the *coité* which was used in Innisfail when the forces of the Vikings burst upon its western shores, and the battle-axe of the Scandinavian drank the blood of the inhabitants. And in the training of their youth, the resemblance is striking. How closely does the training of the North American Indian youth resemble that of the young Viking. His boyish limbs made to anticipate the firmness of maturity; and his soft and tender flesh to acquire the hardness and strength which were needful for dealing and avoiding death. . . . taught to do all that constituted, in northern eyes, the outward merit of an accomplished warrior." Both were addicted to "pride excessive, even to absurdity; sensuality of the coarsest order; and an unsparing cruelty of heart." Both "versed in a warlike etiquette, a species of extravagant and barbaric honor, the spirit of which, in the Northerner of old, as Griffin says: "not a thousand years, of what is called improvement, have banished from the bosom of the world to which they left it."

the middle size. The Iroquois—tallest, straightest, boldest of the family—is much above the stature of the white man; while the woman, in consequence, no doubt, of the severe and oppressive drudgery, is below the standard. The build of both sexes, however, is straight and well-formed; and, as Lawrence observes, deformity never occurs. Catlin speaks of the Osages as being six, six and a half, and seven feet in height. He claims them to be "the tallest race in North America, red or white" (p. 460), as it is claimed for the native Patagonians, a Chilian tribe, which are said to exceed in strength and stature all the other races in the world. The qualities of strength and endurance would, I am satisfied, be successfully contested with them by the aborigines of this part of the continent.

The build of the native Indian is not such as to lead one to suppose him possessed of great physical strength. He has no occupation to develop the muscles of any portion of the body but the legs, for his squaw is set aside to till the ground; bear burdens; preserve and cook the food; and wait on her lord and master while he eats in comfort. *Her* build indicates strength, particularly lumbar strength; *his* indicates agility. Much controversy and discussion have taken place as to the relative strength of the savage and the European; and the opinion is formed by Lawrence, Weld and others that to the latter belongs superior strength. In the North-West, where the *voyageurs* enter into trials of strength with the native the latter, it is true, is frequently worsted.

In all games where the choice has been between an equal number—taken from among an equal number, victory has ever been with the red man. It is unfair to take the young men of a tribe and put them against picked men from among the whites. Even the Esquimaux, inferior, it is believed, to the Loucheux, Chippewayans, Dogribs, Crees and Iroquois—in their leaping matches with the men of Dease's party—selected for their strength

and activity—were victors. And who are the *voyageurs* who contend? Men remarkable for their strength; as superior also to the generality of us, as were the Brobdignagians to the dwellers of Lilliput. I shall again have occasion to allude to those broad-shouldered and deep-chested pemmican and pork consumers; suffice it now to say, that the physical endurance, in walking or running, of our native Indian, has no equal. He has been known to travel eighty miles a day without refreshment or repose, merely chewing a bud or leaf or twig to slake his thirst; and tightening his waist belt occasionally for support. While on these forced journeys he never slakes his thirst, with water, ice or snow. Not unfrequently has it happened, in warfare with those men, that the white man fleeing on his swift horse has, after a long chase, been overtaken by his red pursuer. Some of the feats of the followers of Tecumseh, Brock's faithful ally, read as tales of the Arabian Nights. In some of the dances, when great powers of physical endurance make the "Great Medicine," they have been known to keep time to the monotonous hum-drum of their own voices from sunrise to sunset of the third day, without food of any kind, stamping furiously on the ground, and continually brandishing their arms.

A question often suggests itself—do the aborigines, who impose on themselves severe tortures, feel pain as acutely as the Celt or Saxon? I believe not. The races of men, it may be observed, show remarkable organic differences in this respect. The darker the skin, the less sensitive the individual. A British anatomist has observed that the nerves of the limb of a colored person are at least a third less than those of the Saxon man of the same height. The celebrated Tiedemann was of the same opinion.

But colour of skin does not alone account for the relative sensitiveness met with in certain individuals, and in certain conditions of society. I have long thought that

the French-Canadian *habitant* does not suffer such acute pain under the knife as do other and more sanguineous persons. Many of them object to the use of chloroform, and submit to painful operations without betraying the slightest emotion. The shock to the system is certainly less; and there being less tendency to severe inflammatory action, the healing process goes on with surprising rapidity.

The Indian is capable of extraordinary abstinence from food, and as capable of extraordinary indulgence. He can sit down to a half-dozen feasts in succession, and the rotundity of his form increases in a direct ratio. The boa-constrictor, before and after a feast, is not unlike him. The stomach of the white man would contain but a small portion of what these men consume. Still, all agree that when regularly fed, and with no necessity to stow away a large quantity for an uncertain to-morrow, the Indian is a moderate—indeed a small eater.

For work, Mr. Hopkins thus classifies the *voyageurs* of the north, with whose powers of endurance he was intimately acquainted:—The Iroquois are the best men certainly; French, well indeed; those from the Highlands and Orkneys are good after a year or two, but not at first.

The very nature of the soil and its productions, resulting from climate, favor the development of the race. Nutritious plants and edible fruits and wild animals exist in abundance; and every stream and streamlet is peopled with fish. Whole families can flock together; and on their outskirts find food for their sustenance. Compare this state of things with what exists in Australia, where the climate is said to be as favourable to life and health as it is here. Berthold Seemann tells us in a few words what the native population there is like; and why it is what it is:—"In the Australian native population we behold the oldest as well as the lowest race of men—a race in many instances without any religion whatever, and inca-

pable of mastering any religious teaching—a race unfitted for civilization, and so near the brute creation that it might be appropriately classed with it, if it were not for its power of language, and the only ingenious thing in its possession—the boomerang."

When Canada was first discovered,* even then the aborigines were a proud race, of dignified port, terrible in war, mild in peace, maintaining order without the restraint of law, and uniting, by the closest ties, the members of the same community." They had "their orators, statesmen, and warriors." Although they were supposed to evince an "unconquerable aversion for stationary abode, or the restraints and even securities of civilized life," that disposition seemed to have been forced upon them by the necessities of life.

The regularity of the Indian countenance is very striking. With his face darkened by the effects of the sun's rays he appears not only in form but in figure as if well fashioned in bronze. The beauty of the Indian form has often been admired. Mons. Tachè, writer of some beautiful legends in "Les Soirées Canadiennes," says: Si parfait de formes, si magnifiquement developpés . . . qui pourraient, surtout pour les mains et pour les pieds, servir de modèles aux artistes." The Micmacs are here alluded to, who comprise the greater part of the Aborigines of the Baie des Chaleurs and the corresponding parts of the St. Lawrence.

While the physique of the children of the forest is unsurpassed in symmetry and beauty, travellers, and

* Perhaps nothing will ever be more authentic than that this continent was discovered by Northmen in the tenth century—"five hundred years before Columbus planted the cross on the island of San Salvador." And although a historian like Bancroft may deny the claim of the Northmen to that honor, the *Antiquitates Americanæ* published in Copenhagen have furnished abundant, if not indubitable proof—other learned societies have since supported these views of the Icelandic Sagas—that the discovery of the mainland in 986 was due to Bjarni, son of Herjulf.

chiefly Charlevoix, Lafitau, and others, have shown very satisfactorily that their language, and particularly that of the northern tribes, is quite equal in methodical arrangement, flexibility, imagery, forms of fancy, and above all, in adaptability to change, to the Semitic languages of other climes.

Unlike the aborigines of any other country, the natives of our forests speak in poetic strains, which are simpler than those of warmer climes—yet which give evidence of that thought and reflection which were supposed to be indigenous to a milder clime.

The legends of the aborigines have many traces of the grotesque and the terrible. Their indolence or inactivity, even, would seem to nourish that wild romance which the ceaseless activity of the white usurper effectually destroys.

Although the Indian speaks but seldom, and records his assent merely with a "hoogh," or his dissent with a "kaween;" in his rhetorical efforts he displays a quickness of perception; a delicacy of taste; and a fluency of expression which one of the greatest of modern orators (Erskine) has studied to imitate. The Indian clothes his sense and meaning in expressions that are simple, but forcible, and natural. His imagery is picturesque, and drawn from objects around him: the trees of the forest—the wild animals that inhabit it—the desecrated grave of his forefathers—the ruined hunting ground—or the white man's perfidy. The expressions which come naturally to his lips are poetical; and the poetry, like that of masters in the art, derive all authority from nature, without being subjected to rules which destroy *vraisemblance*.

Their poetry, if it can properly be called poetry, is not unlike that of the ancient Dane, which had an air of flowing exaggeration and wildness of imagery, though everything like metrical beauty may have been wanting; and with a ruggedness which is ever its best ornament.

De Quincey, in one of his day-dreams, when in Clifton, is led into a speculation on the essential differences of savage and civilized life: "How much of the virtue and moral elevation found amongst the Northern Indians is due to the influences of beautiful scenery?" and in doing so, he admits, that for their virtue and moral elevation among civilized men "seclusion from such scenery must be compensated by the visional representations of it in pictures, and the intellectual suggestions of it (or pictures in vision) in poems, romances," etc.

The languages of the Algonquins, Sioux and Hurons are of an energy and a precision of which it is difficult to form an idea. The metaphors are of the boldest; and their familiar conversation is as easy, and even as graceful, as if in the epics of the languages of Europe. Their imagery is wild, and sometimes fantastic. It may be often bright but unequal, and sometimes evanescent, and wanting in that quality of cohesion—that Zusammenhang—which binds together the language of their white brethren; yet withal, there is variety. The dialects of the various tribes of aborigines do not exhibit the same degree of tenacity: while some are plastic and easily moulded; others exhibit as great tenacity of life as the Welshman's Cymry.

The language of the extreme northern aborigines—as the Esquimaux—is singularly like Hebrew in construction, the subject always following the verb.

The language of some Indian tribes—the Iroquois for instance—of the 18th and 19th centuries, is more pliant than was that of Chaucer, first true English poet of the 14th century, where "rhythmical cadence once charmed the ear of the Court at the time of John of Gaunt." If a great poet, as Chaucer undoubtedly was, "may not be the less homeric because he has never read Homer," or even heard of him, so may a people—nurtured in solitude, and struggling for existence with the untamed savage beasts

of the forest, and in a constant state of warfare with other tribes more terrible and more implacable than the most savage animals; with legends which told them of an origin beyond the soil; which told them of an ambition that is insatiable for distinction among their own tribe, and for being regarded with terror by hostile tribes—have a poetry to embody it. With inordinate love of approbation of their own ancients, the young man has sought the haunts of the fiercest animals; mimicked their savagery; and at length tomahawked them; and on his return has told to the assembled, in simple but forcible language, and with poetic feeling, the tale of daring.

In the opinion of many, the Danish warriors were the "progenitors of European honour" and the haughty fathers of the duel, whose spirit, descending to the nations which they half subdued—gave birth to the scenes which rivalled the gladiatorial shows of Ethnic Rome in extent and barbarity."

In reading the accounts of the warlike denizens of the banks of the Sala, a Canadian reader is constantly reminded of the plays and pastimes, privations and trials of our own redman, as if the latter inherited those qualities from them. There is, however, another quality, possessed alike by the warlike Swede of more than a thousand years ago, and the red man of to-day—a quality which the former has not fully succeeded in transmitting to his progeny, and the latter has not always received from his white dispossessor: an observance of *truth*, which was never violated even though life itself was the price of its observance.

Their songs in praise of their warriors and young men resemble the songs of the ancient Scallas, and the same qualities are extolled by each:

His hand was never yet withheld from bloodshed;
His heart is ignorant of the feeling of forgiveness.
The groans of the dying, the shrieks of the despairing mother;
The wail of the young infant turn him not aside.
Wherever he treads the very earth is robbed of her fleece.

The names of places, when *correctly written* and pronounced, have their meaning now; and had their meaning when the early explorers disturbed the red man in the solitude of the forest. But what was unwritten was commonly misunderstood; and what was meant by the aborigines to be of local origin, and indicative of certain local features was, as written, and as subsequently adopted for the sake of euphony, but "the blunders of the first Europeans, demanding by signs, and catching at words, by which neither party were intelligible to one another." But a subsequent more intimate acquaintance with the descendants of these aborigines has, to some extent, corrected the partial errors of the early voyageurs; and although many tribes have disappeared, and with them their peculiar dialects, sufficient remains to show us a freedom from harshness in sound and a significance in meaning unknown to those who first heard them. Some of our American poets, and markedly Cooper and Longfellow, have chronicled much of these, in their imperishable writings.

If the power of enduring fatigue is an index to physical strength; and if the language of a people is a true index to their mental condition, then have we evidence that the climate of Canada has, in untold centuries—unaided by art or civilization—produced a nation, compared to which, in physical energy and mental power, the aborigines of every other clime are much inferior.

And where else have the aborigines of other countries in surrounding nature so much to stimulate or incite. "I have passed the night," says the Hon. A. Gordon, speaking of New Brunswick, "shivering on a mountain side, awaiting for the dawn. I have passed it stretched on the long grass of the Hauran, snatching short slumbers under the Syrian moonlight, with my horse's bridle around my arm. I have spent it in many different places, under circumstances calculated to inspire strange and solemn thoughts;

but never anywhere with so awful a sense of man's insignificance, and of the calm changelessness of nature, as in the depths of the American forest;" and it is thoughts like these which seek poetic embodiment.

If man partakes in any degree of the influences that surround him, man, in a state of nature, must have his history comprised in that of organic nature. And when we look at our magnificent forests and their *wilde*, we look, in the unity of organization—that "ganze Reihe der lebens formen von den niedrigsten Protisten bis zu dem höchsten menschlichen Organismus"—for a majestic, well-formed savage, and we find him. Having failed to subdue the more obdurate vegetable world—indeed, having never attempted it—he has already disposed of the animal world around him; or has the power to subdue it at his pleasure. Apart altogether from the profit thence arising, hunting is a real pleasure to him, as it affords him violent exercise of the body, without the pain of serious thinking or of labour. Surpassing the fox in cunning; the wild cat in patience; and, if needs be, the lynx in cruelty, the necessities of life render him cautious and vigilant, provident, and at the same time reflective. When cereals and fruit blossoms first appear, and game is near, he is thinking how much will remain of what he secures, for that cold season, when, without them, everything would betoken famine. The experience of past years is to him a guide to the future. This forethought has developed in the aborigines a vast preponderance of the reflective faculties, of which the white man is often glad to avail himself. Compared with the aborigines of other countries, that preponderance will be apparent. The latter are heedless of to-morrow, satisfied with knowing that the earth is teeming with life, and life-sustaining food; while here, without due provision, the savage sees, in anticipation, the "eye of Pauguk glaring on him in the darkness."

All travellers admit the redman's wonderful sagacity in

circumstances of difficulty and danger. But the quality which is most prized in him, and most utilized by the white man, is the knowledge, or instinct, which guides him on journeys, of many weeks' duration, unerringly through the pathless forest which he had once traversed, where the white man's compass, and sextant, and artificial horizon are not more than sufficient to prevent his going astray. All travellers speak of the accuracy of information furnished by the savages generally, and chiefly by the Esquimaux.

It never occurs to the red man to doubt the truth of what is told him; but it likewise never again occurs to him to believe in one by whom he has been once deceived. It is the strict observance of treaties in Canada which causes him to trust so confidingly in the Great Queen-Mother; and commercial companies, by a like observance of terms of contract, have obtained the red man's confidence. The Hudson's Bay Company, markedly, in its dealings with them, has secured their entire reliance. Should a servant of the company, to lighten his load, be forced to leave a package in a pathway of the forest —it might, perchance, be of groceries—the Indian, in passing, notices it; but he notices, at the same time, the symbol which tells him it belongs to a company which has ever kept faith with him; and, though famishing, he passes on, leaving it untouched. It would be an unhappy day for Canada should any rapacious servant of the Government, more interested in speculation than zealous in the performance of duty, diminish that trust and confidence. The soldiers of the Dominion would not secure to peace and safety what would be lost by this being unshipped. The aggressive white settler has done much to disturb that confidence; but the savage can distinguish between what are the acts of an individual, and those of a government—between him who regards the red man as standing in the way of his accumu-

lativeness ; and the government which protects all alike—between him who once alone possessed the soil, and him who sought it, after centuries, as his home.

Here in Canada the aborigines are, happily, still regarded with the interest which attaches to men who were the earliest settlers. In the adjoining Union, on the other hand, as Professor Tyler says, he is no longer a mysterious or even an "interesting personage—he is simply a fierce, dull biped standingin our way!"

But the time of their departure has come! and they have these facts ever staring them in the face : that their race is steadily decreasing ; that to the white man must belong the soil ; and that the day is not far distant when it will be clear of its native inhabitants. Is it between the white and red man, as amongst plants, where a silent struggle for the possession of the soil is constantly going on? Even when no foreign elements are introduced into the flora of a country, it is ever at work. But it becomes much more intense when species from abroad appear on the field. At all events, when we are able to recognize, at a glance, the opposing elements, we are in a better position to watch the struggle and its issue.

Foreign plants, as Seeman observes, deport themselves towards the indigenous, as an invading army does towards the inhabitants of a hostile country. First, the outposts—hardy weeds—appear, where the soil has been disturbed by man, and are the *foreigners* or colonists, but are "never endemic children of the soil on which they flourish." They had to "surmount the difficulties which new comers in all countries have to face ; but they also benefit by the advantages derived from their organization, coming, for the first time, in contact with a soil to them altogether virgin." And if the climate and other conditions required for their existence are fulfilled, the new comers "will invariably become the victors in the great struggle for existence which immediately commences between them and the

natives. And man's own history furnishes some of the most striking proofs of its catholicity. New comers, always provided they gain a firm footing, have ever the advantage over those species or races established in the country before their arrival." The rotation of crops; the success that attends the introduction of newly imported seed,—identical, perhaps, with that already sown,—are evidences of the *chemical* advantages enjoyed by new comers.

European plants, transferred to Canada, have taken vigorous hold of the soil, and some, as the thistle, have attained a vigour unwonted in Great Britain, so that what, in its northern position, is, at best, a pretty flowering plant, keeping closely to the ground, and possessing just sufficient of the sting in it to give meaning to the motto: *Nemo me impune lacessit*, is here a tall, strong, weedy customer, defying sickle, scythe or harrow; and yielding only to the stifling process of a rich compost.

That the chemical composition of the soil and of the atmosphere produce those changes, may be gathered from other circumstances, difficult to explain: that plants transferred from this soil to Europe, while continuing to thrive, display no tendency to spread beyond control and become weedy, but comport themselves as their more staid sister plants around them. They do not enjoy in Europe the advantages of new comers, but would rather be like "wanderers, returning to a country where their part has already been played out"; and where, as persons returning after a lengthened residence here, often find, to their disappointment, they do not fit in so readily and so cosily as they had fondly hoped.

And so may it be with the first occupants of our soil, destined so soon to disappear from off the surface of the earth. The various Indian tribes thinly scattered over the continent, of which remnants alone still survive, have, no doubt, had their period of active infancy and vigorous

youth, as they have now of decay; and it would be idle to suppose that the present condition has been a long-existing one. The savage is supposed to have had his "fair innings," as a writer styles it. He has been associated with a flora that is passing—nay, that has passed—away, representing a race much older than the races which have supplanted him, as he is by many supposed to have occupied Europe "ages before the Aryan race left its Asiatic home." If this view be correct, there is a tinge of comfort in the belief, that it is to an irresistible law in Nature, and not alone to the white man's rifle, and his "fire-water," and his small-pox that are to be traced the dying out of a most interesting people—

"Stoics of the woods, the men without a tear."

In writing of them it feels as if chanting their sad funereal dirge. I am appalled, on consulting statistical records, to notice that there are not now, in the whole Dominion, sufficient to two-thirds stock a city of the population of Montreal! There are but 109,000, all told! The Indian Territories have 49,472; British Columbia has 25,461; Ontario, Quebec and the other provinces have the remainder of this poor remnant!

The *low birth-rate* among the aborigines is pointed at as an evidence of the baneful influence of this climate on natural increase. In general terms it may be observed that the procreative power of a country has, within certain limits, a certain relationship to the ability of the soil to support its inhabitants. When the population exceeds that ability of the soil, other and novel restraints come into operation, either to check or to destroy: though sometimes, unhappily (as in the northern United States), these restraints come into operation in the midst of abundance.

The aborigines of this portion of the continent afford, to the superficial observer, evidence of the absence of that

prolificness which is claimed for the white races in Canada. But it must be borne in mind that climate is not the only factor in determining it, and to a few of these, other than climate, I shall allude.

Agriculture being almost unknown amongst them, it supplements, to an insignificant extent, the uncertain subsistence acquired by the chase. It is not that the aborigines are never sufficiently numerous to devote themselves to agriculture; but they are either too indolent, or are in some way disinclined to increase, by needful measures, their means of subsistence. Some tribes trust almost entirely to hunting; some to fishing; but most, at times, to both. Fishing necessarily implies living—yet in moderate numbers—near the borders of lakes and rivers, at seasons favorable to fishing; while hunting necessarily implies still more moderate numbers, and a still greater extent of country to roam over. As the food is limited in quantity, and cannot be brought together, save as the necessities of the wild animals impel them to move from one part to another, it follows that food is often scarce—often insufficient. But scarcity and insufficiency of food are less a hindrance to population than is the enforced scattering of the tribes; and the enforced neglect of the women by the men of the tribes. In places where food is more abundant, and where the men are not obliged to keep greatly in advance of the women, the latter are more valued. But even when most valued, her lot is a pitiful and degraded one. Her work is never at an end. Her husband kills the game, but everything else is done by her. She "fans him while he sleeps and trembles while he wakes." If she has twins, one alone is permitted to live; if a child is born with any deformity, it is exposed. The healthy, strong, vigorous and well-formed is alone permitted to live; and upon that one the mother's attention is lavished. She suckles it till it is six or seven years old, and it is a conventional arrangement that during the long period of lactation—and which, for

prudential reasons, is sometimes still further prolonged—the husband does not disturb her.

But even ante-natal life is not without its dangers. The severe toil of the mother; her exposure to the inclemency of the seasons; her forced marches, etc., etc., are so many risks to the unborn. But there must also be added the knowledge of procuring abortion, with which married and unmarried are said to be familiar.*

The diseases of savage life are few, 'tis true, but they are of an active, inflammatory character; while certain diseases, as small-pox, are fatal in the extreme.

The absence of ventilation is also a severe test of health and strength; and although the aborigines are accustomed to it, their proneness to consumption is probably due to this cause. The stench of these confined wigwams is such as no nostril can bear. Perouse says "their cabins have a nastiness and stench to which the den of no known animal in the world can be compared."

The habits of gormandizing after prolonged fasting are most hurtful to the grown of both sexes, and to the children, than is the fasting itself. Indigestion and *embarras gastrique* are the result.

In places where he comes into contact with the white settler, unless a dread of the law restrains him, the fondness of the red man for spirituous liquors is an universal passion. No white man displays such an intense love for whiskey; and while the whites are differently influenced according to the difference in temperament, with the red man, the use of stimulants certainly produces quarrelling and fighting which too often terminate fatally to the unborn.

But all these hindrances to increasing population among the aborigines are—while not to be ignored—inconsider-

* This was and is only where Christianity has not penetrated. The Christian Indian does not demand, and the Christian squaw is not forced to rid herself of her burden to please her selfish lord.

able in comparison with those causes inseparable from a nomadic existence* in a region of the world where inactivity and improvidence are far more dangerous than they are in those countries where Nature is teeming with vegetable life; and where, as in Canada, the severit of the climate on the human frame demands a more steady and more abundant supply of carbonaceous matter than is required in higher or moister temperatures.

Our aborigines are much like the wild animals they prey upon: they drive away, or fly from, every rival that can diminish the fish of their streams, or divide with them the game of their forests! They are thus engaged in perpetual contests with each other. And these contests are fiercest where game is most abundant and draws the greatest number of hunters; or where, along those bays, lakes, and streams, fish are in greatest numbers Nor does it occur to them to favour or increase the produce of another season by any present foresight. To save even a lean animal, when heavy with young, occupies no part of their laws; and in their battles, which are but surprises, they are made as destructive as possible—every living thing is destroyed or carried off, lest a strange tribe should profit by it. The life of incessant watchfulness, in which both men and women are obliged to live, is not favourable to great prolificness; while the state of unrest and alarm; of ceaseless danger and of violence, although borne with unmoved patience, and without any outward manifestation of concern, too often disturbs the current of gestation.

* About thirty miles from Montreal there is a small stream called "Tien Chien," and legend gives this origin to the name:—A squaw, moving with her family to a new camping ground, was seized with the pains of labour. The husband continued his journey with the dogs, utensils and children, leaving the wife, with a small quantity of food, at the foot of a tree. When recovered, she strapped the little one to her and trudged after, as best she could. Several days elapsed, however, ere she rejoined them, as they were encamped on the bank of the little river; and the angry salute to her husband, as she threw the child to him, was the origin of the name of the stream.

It is a singular circumstance, and noted by the Abbé Lacombe,—who has laboured so much among them, and who has rendered such signal service in the cause of law, order and morality—that wherever polygamy exists among the aborigines the number of births is smaller than among the monogamous. This is so different from what is believed, but on insufficient data, in the eastern hemisphere, that I willingly record it. The Mahommedan is told to be polygamous that he may raise more children to God; and here the aborigine is told to have but one wife for a like reason. The advice given here by the Christian missionary, apart altogether from its morality—if the question can be so viewed—is the sound one, and is quite in keeping with what has been observed by Eton, that "Christian families"—and he might have included the Jewish—"consist of a greater number of children than the Mahommedan families in which polygamy exists." Be that as it may, that a plurality of wives is not indicative of a numerous offspring, is a fact which so strikes the imagination of the red man, that missionaries have little difficulty in persuading him to keep to one.

The Teuton.

Here in Canada we have members of the two great families—the Teuton Saxon and the Celt—still displaying the peculiarities for which they have ever been distinguished. The former spreading himself over a land a hundred times too large for his wants—still unsatisfied, remarks a writer, if he has a neighbour within miles of him. The former possessing power by virtue of his strong individuality; the latter by virtue of the principle of collectiveness, though not always of cohesion. In obedience to that quality of race—that love of independence—that dislike of proximity—the former penetrates the forest and builds his cabin. Canada, with its thousands of acres of unoccupied land, and the great North-west can alone afford him breathing space. Wherever he goes he carries with

him a love of labour—which soon makes him rich; a love of order; a love of truth—which earns for him respect and confidence; a love of punctuality—arising from natural truthfulness and a love of order. Serious, thoughtful, self-confident, his mind is more occupied with the present than with the past, and perhaps, than with the future. He here finds every liberty, and he prizes it. He here finds a federal parliament equal to the common wants and interests of this vast Dominion of diverse conditions; and a dozen provincial parliaments suited to the local wants of each province. He has aided in creating them; and, considering them bulwarks of liberty, he would not suffer them to be marred. He here exhibits greater forethought than in Great Britain,—a forethought the more necessary for his existence among those of forethought; and the greater degree of mental and bodily activity here put forth is somewhat influenced by the greater suddenness in the changes of the seasons. The desire—the too great desire—of wealth, and its attendant comforts, his accumulations soon place within his reach. He here manifests that "dislike to abstract reasoning and to the affirming of general principles" which he exhibits in Europe. He has an abstract sense of justice to others, of the same race; and a feeling approaching to contempt of those of other races—a feeling which not unfrequently finds utterance. Such is, then, the Saxon or Scandinavian. But he is now so amalgamated with the English-speaking of other nationalities that we have a difficulty greater than had Livy when he described him. In physique the Englishman has still the large body and small limbs —more capable of great marches than of sustaining great weight. His occupancy of the soil, however, is yet too short to have had developed, in any marked degree, the result of those influences of climate we naturally look for in those long exposed to them.

I have not separate or precise *data*, as the times of their

arrival cannot be always clearly established; and they are more merged into the general mass.

Irish.

In physical strength and vigour the Hibernian has not degenerated. I could quote from many sources, in support of this statement; but I shall confine myself to the remarks of the Hon. T. W. Anglin, whose accuracy of observation is well known. Mr. Anglin was born in Ireland, where he spent his youth and early manhood. After his arrival in Canada he lived the greater part of the time in an eastern, and afterwards in a western province. He has always mixed much with the people; was member of the Canadian Parliament for many years; and during a portion of that time, its Speaker. His remarks are so germane to the subject that I quote them *in extenso:*

"I cannot say much concerning the comparative physical development of the Irish of the second or third generation in Canada, as I have never made this the subject of critical observation. I have had opportunities, however, of seeing large numbers of the Irish in New Brunswick, Nova Scotia, Prince Edward Island and Ontario. Some left Ireland at an early age; some after they had reached the full age of manhood or womanhood; some were the children and some the grandchildren of Irish immigrants. My decided impression is that those who have been brought up in this country in healthful employment, calculated to develop the frame and muscles, are physically superior—take them all in all—to their immigrant fathers and grandfathers. They are taller, the frame is larger, and the muscular development more striking. The sons and daughters of Irish farmers settled in any of our provinces are usually tall, strapping fellows, broad-shouldered and full-chested, with muscles of shoulders, arms, chest and legs bulging through coat and trousers. The young women of that class are as healthy,

blooming and robust. The same may be said of the mechanics and labourers in our cities and towns who are not overworked, or underfed, or engaged in unhealthy occupations. A finer body of men than the 'longshoremen of St. John, N.B., many of whom are natives of that province, or than the Emerald Beneficial Association of Toronto, could not be seen in any part of the world. I have not seen any of the Irish bodies in Montreal parade for some years, but my recollection of the Young Irishmen of that city is that physically they too are magnificent fellows. The improvement in the features is even more marked. Among the poorest Irish labourers one often sees a head and face of noble mould; but many show the effects of centuries of hard work, low diet, and lack of education. The native beauty of the race is much more manifest in those born in Canada than in those who were immigrants.

"Irish women, born and bred in the cities, I am told, are in some respects physically inferior to their immigrant mothers or grandmothers. Your own observation, however, on that point would be of greater value."

The Hibernian here exhibits all—yet not all—the qualities of mind and of heart which mark him as a distinct type in his native land. His social status is here so different from what it is ere, that he is not afraid to display wealth which is entirely his own, exhibition of the outform of which, in a lesser degree, in the native home of his forefathers, might, were he of the tenant class, lead to its diminution. Nor is he, for the same reason, here required to suppress truth, the expression of which in his native land he might consider hazardous to his interests. He has not here that excuse of discontent which is so evident in his transatlantic home. The liberty which he here fully enjoys, in common with others, makes him sympahetic; and his naturally frank character receives in Canada still further development.

His powers of *earning* wealth are equal to those of other nationalities; but his powers of preserving it might be enhanced, were it desirable, by a closer observance of the economical habits of others.

The Scotch have changed least of all; and as the Scotchman is painted by a Christopher North or a Scott, such is he here to-day. But he is still distinguished by qualities not of Canadian, but of European growth. That tenacity of character, which is so marked a characteristic in Europe, is here still more developed. In the first generation he never acquires that unpleasant nasal accompaniment to speech, so readily learned by those of other nationalities; but the Scottish accent (purest of English! he will tell you) is preserved and prided in, through life. It is even assumed, sometimes, by those who had it not when they came here. His national preferences do not suffer by transplantation; and one hardy Scot has his fair innings with "anither brither Scot" not less certainly here than in the native home of both.

Mr. E. M. Hopkins—to whom I have already referred, and to whom I refer again with confidence—recognizes, and wisely recognizes, the advantages of a residence in Canada, even for a few years, in developing the muscular strength of those who, in Europe, rank high among the stronger nations, when he says:—"Those from the Highlands and Orkneys are good *after a year or two, but not at first.*" It would appear, therefore, that a "year or two" is necessary to bring him up to the standard [where a bracing climate had already placed his fellow-countryman who had preceded him, now in every quality a *voyageur*,] with the Iroquois and the French-Canadian.

There is no part of Canada where better and more athletic Scotchmen are now to be met with than in Glengarry. In 1783 a number of United Empire Loyalists of Scotch descent settled there; in 1786 they were reinforced by emigration from Croidart in Inverness-shire in

Scotland; Bishop McDonald, chaplain to the Glengarry Fencibles, came with his contingent in 1802. What is now the experience of the people of Glengarry? That any new accession from Scotland is not equal to the acclimatized in strength and endurance. It requires sometimes several years, sometimes a generation or two, to develop anything like that strength of which they have here given such examples in the last few years. And this increased strength, I may add, coincides with early marriages and increased prolificness.

Those broad-shouldered, powerful swingers of the heavy hammer, and putters of the heavy stone have sometimes exhibited their feats of strength in Montreal. Rory McLennan, Alexander McPherson, Christy McRae, Archie Macdonell and others would have astonished the believers with Knox that the climate of this country is prejudicial to strength. None of these men were less than the third or fourth generation inhabiting this country; and Christopher North, the "Ettrick Shepherd," had he seen the tremendous strength of these hardy descendants of immigrants from the Hebrides and Inverness, with "twa naked arms o' a fearsome thickness, a' crawling wi' sinews like a yard o' cable to the sheet-anchor o' a man-o'-war," would not have thought it an injustice that I should use his graphic delineation in my allusion to them. Rory McLennan's swinging of the heavy hammer was so powerful that the late Hon. Sandfield Macdonald challenged Scotland to produce his equal.*

So far, then, there is no evidence of deterioration in the English, Scotch or Irish *physique*. Persons of those nationalities preserve, without loss, what was transmitted to them; while here and there are unmistakable evidences

* At one of the Caledonia games in this city, the committee, composed of persons recently from Scotland, marked off a place within which to put the stone or swing the hammer; but Sandy McRae and others protested that no pent-up utica should contract their powers; and, as an earnest, sent the heavy missiles through the fence many feet beyond.

of increase. But I must needs content myself with casual observations in the meantime, still supplemented by figures which will not be gainsaid.

French-Canadians.

Between two and three centuries ago, a small band of healthy French settled on the shores of the St. Lawrence. They came from a fertile and compact territory—where a "happy climate, midway between the rigour of northern and the amenity of southern latitudes, at once rouses effort by necessity and softens manners by enjoyment." The greater numbers were from Normandy and Bretagne; but some there were from Picardy; some from Poitou; some from Saintonge; a few from Anjou, and yet a few from Champagne. In 1663 the population of Canada was 2500, according to seemingly well-informed writers, to be met with chiefly at Tadousac, Quebec and Montreal. In 1760 there returned to France, after the capitulation, 185 officers, 2,400 foot and artillery, 500 sailors, women and children. In 1763, 1,000 to 1,200 returned to France. It was estimated that at about the period of the capitulation (1763) the French population was between 60,000 and 70,000, from whom are descended the French population of to-day, numbering in the Dominion 1,300,000, of whom 1,073,820 are in the Province of Quebec alone, 102,743 in Ontario, 56,635 in New Brunswick, 41,219 in Nova Scotia, and the remaining Provinces the balance; besides 500,000 who have migrated to the United States! Without claiming for them pre-eminence in anything, it may be admitted that those pioneers of civilization, and those who followed them, brought with them to this country, something more powerful than name or wealth, or chivalric grace: a courage to contest empire with Nature and her lord, the red man; a sincerity of belief which promised them in the end a victory; a perseverance; a vigour; and an energy which knew no interruption, no rest. Men accustomed to luxury and repose would not have been

equal to what was then considered a long voyage of fatigue and danger; and would have been unable to exist in, and unwilling to try the unaccustomed influences of an unknown climate; and more than all that impatience of solitude—grand though it be—which surrounded them. The children of France, in seeking these shores, seemed to be little impelled by cupidity. There was nothing cruel in their advent. They used no violence, though they suffered much. They devastated no region; usurped no possession; but quietly and peacably—olive branch in hand—endeavoured to take root in the soil with the red man; share in his occupation, his sports, his pastimes; and sow, reap, build, drain with him and for him, and ally himself in marriage No bayonets forced a passage for them, but missionaries from their country preceded them; lived among savages, and oftentimes much like them, that savages might become less barbarous, and at length become Christian. Those early missionaries, which even the pen of a Parkman is feeble to delineate, learned the language of the savage tribes, hunted with them—oftentimes was hunted to death by them—till the most warlike—who recognised no law but that of force; no power but that of cruelty and cunning—meekly bent the neck to the light yoke of Christian faith. Although the followers did not fully require the same qualities which distinguished those early pioneers, still there has, so far, been visible nowhere among them that species of *laisser aller*, which so characterizes, and is so charming a feature among, the higher classes in Europe, and the few families amongst us who belonged to those favored classes before their migration to this country.

It was no easy task for the immigrant to force the bold red man still further into the forest; to seize a strip of land along the border of our streams; to clear and to till it; to build a cabin, and to rear children in the midst of dangers from an enemy that menaced him at every step. It was

the ceaseless vigilance which developed that individuality which is ever cropping out, not less—though in a different form—in our rural population, than in Mr. Samuel Slick, the clockmaker. If "les privations, la pauvreté, la misère sont l'école du bon soldat," then were the earlier settlers trained in a school which fitted them for the severe duties they were soon to undergo. When danger from the aborigines had passed away; when the earth had responded to the husbandman's toil; and when food had become abundant, the mode of living continued—and in many parts still continues—to be simple; and this has produced the most solid happiness compatible with the frugality of the human race—happiness which fatigues not; which brings no vapours of melancholy, and no unsatisfied longings which parental, conjugal, and filial love cannot and do not supply:—a mode of living in the highest degree favorable to health and population. The war of race—for such a war there must be where two races live side by side—is no longer between them and the red man The former have already carried that war of races into the adjoining Union; and thoughtful writers, as Nathan Allan and others, have noticed with alarm that while the native woman produces but few children, the Canadian woman produces many.

Two hundred years later, and what do we observe? Receiving no accretion from without, they have progressed in a manner which defies all parallel, stamping them with a character which does not now belong to the European family of which they are the off-shoot. If prolificness be commensurate with health (and there is a physiological standard associated with fruitfulness, as there is a pathological one confederate with barrenness) the descendants of the early settlers from Brittany and Normandy have abundant health. The most superficial observer must have noticed great dissimilitude between the children of the earlier settlers and the European descendants of their progenitors.

The first settlers in a country are rarely of that class which moulds and fashions, or which tries to mould and fashion aught save its own fortune. They are usually usurpers of a stern type—rough, vigorous, uncompromising, self-asserting and predatory; indifferent as to means, but watchful as to results. They usually flow down from higher, colder and more sterile, to lower, warmer and more fertile regions—as the Lena, the Amoor and the Ganges flow from the mountainous countries of Asia to the shores of many seas; or as the mountaineer, from the barren high, to the fatter low lands.

In the older and French-peopled portions of old Canada the first settlers were intelligent, civilized, and even refined—vigorous, 'tis true, but neither rough, self-asserting nor predatory. They carried with them, to the land of their adoption, the politeness and refinement of the country they had left; and at a period, too, when French manners and *courtoisie* were perhaps at their height.

Canadians have had no privileged classes to trample on them. The seigneurs among them possessed influence; but it was unlike the influence wielded by the more favoured classes in Europe. The former possessed no power not enjoyed by the humblest; and no influence save that which superior culture, refinement and wealth commonly confer upon their possessors.

Although their struggles for life with the Huron, and afterwards with the Iroquois, were incessant and severe, yet we read nowhere of accounts of shooting Indians like game as an appetizer before breakfast, which subsequently disgraced the more western settler, with less excuse than had he of the first arrival, to minister to destructiveness.

The different manner in which the French and English formed their settlements was characteristic of their respective national dispositions. Alison, quoting Malte Brun, says the English, when they first set foot in America, settled on the sea coast, in a comparatively

sterile soil; gradually cleared it by efforts of persevering industry; and, after the lapse of a century and a half, surmounted the ridge of the Alleghanies, and spread themselves over the alluvial plains of the Ohio and the Mississippi, the garden of North America. The French, with far superior penetration, followed, from the first, the course of the great rivers, and established stations which, if adequately supported and sustained, would, beyond all question, have given them the empire of the New World! Ascending the course of the St. Lawrence, they placed extensive colonies at Montreal, Toronto and Quebec; descending the Ohio and Mississippi, their flag was to be seen at Louisburg and New Orleans. But, though amply endowed with the genius which conceives, they had not the perseverance which makes colonies; they sought at once to snatch greatness as by the vehemence of military conquest—they could not submit to win it by the toil of pacific exertion. They did not spread into the woods and subdue Nature by the enduring labor of freemen. Hence the different destinies of the two colonial empires in America: the English, inconsiderately formed at first, was slowly raised by persevering industry to unparalleled greatness; the French, magnificently conceived in the outset, and aiming at inclosing the New World in its arms, sunk in the first rude shock before the strokes of its less aspiring rival."

It may be that circumstances other than climate have here moulded the character of the former; but of this there can be no doubt: that to climate, in its widest sense—I mean to *all* the circumstances in which they live—are to be referred a remarkable change in physique, to vhich I shall again allude. Living in the plenitude of life, constantly in the open air, and in the pursuit of labour which developes that physique to the farthest—in childhood permitted to grow and to strengthen by resisting the heat of summer and the winter's cold, till both become

indifferent to them, or are made to minister to their comfort. That they have grown up strong and now form the healthiest white people on this continent, it were useless to deny. In the women the lymphatic and sanguineous temperaments are well developed, together with vigorous and healthy digestive organs, and with their whole organism well and harmoniously balanced—qualities necessary, as Dr. Nathan Allen observes, in women who wish to rear healthy children with the substance of their own bodies. They have no demand for wet nurses to help them, how much soever they may help others in that capacity. Nor is there wanting, at the same time, in those deep-bosomed matrons the more lively qualities of mind which make the humblest French-Canadian woman equal in conversation and repartee to her more wealthy sister.

The strength of some of the men may—to those who look only at the lesser bulk of the French-Canadian as compared with that of the English-speaking—appear to be somewhat exaggerated; but those who are at all familiar with the exploits of some of the descendants of the early Norman and Breton settlers in Canada, will bear me out when I state that that nationality has produced some of the strongest men who have ever inhabited this country.

The De Salaberrys, Duchesnays, Lacasses; the Grenons, Montferants, Monarques; the Dumouchels, Tranchemontagnes, and others, whose names do not now occur to me, have, for generations, been possessed of tremendous muscular strength. A De Salaberry has struggled against six ordinary men; two brothers, Duchesnay, have, on the Richelieu river, stood, back to back, and levelled a whole crowd; Montferant's strength appeared to be almost fabulous, and in the North-West he more than once saved his life by tremendous marches to escape the Indians, who much envied him the possession of his strength. The late Sir George Simpson once spoke to me of his terrible strength—strength associated, as it should ever be, with

the tenderness of a little child. On one occasion he carried, at the portage of Grand Calumet, loads weighing 505 pounds each, half a league at a time, without depositing them; continuing the labour from 4 a.m. to 10.30 p.m. Joseph Montferant dit Fabre was then 27 years of age, was 6 feet 4¾ inches, and weighed 182 lbs.*

On one occasion he started with nine men for Fort McKenzie. John Knight, a Scotchman (interpreter), Gillespie and McLeod were of the party; the rest were picked Indians. The journey was performed in January. Neither rest nor halt was indulged in till the end; no food, no drink, was taken; but, without halting, a bud or twig would be nipped off with the teeth in passing, and chewed to keep the mouth moistened.† Of these, six made the journey, the rest having fallen by the wayside. But of those six, one only (an Indian) with Montferant survived, the remaining four died within two months. The Indians ever after called him "Mandji" (man-eater). It is remarkable that all those nine were between twenty-four and twenty-six years of age.‡

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*I saw him when, at 64 years of age, he was living at the corner of Mignonne and Sanguinet streets, in this city, suffering from opthalmia. His splendid frame still attested his enormous strength.

†This hint was quietly given to Montferant by an Indian woman ere he started: "Don't touch water, don't touch snow, don't stop, don't sleep."

‡Of the strength of the others I could cite many instances; but one, from the pen of M. de Gaspé, concerning Grenon will suffice. Grenon, one Sunday, when walking in the woods, came across a full-grown bear. The animal attempted to escape, but his pursuer was at his heels, brought him to bay, and at length succeeded in seizing him by the back of the neck, and in this way managed to arrive at the church door of Baie St. Paul, as the people were collecting for mass. Grenon, it would appear, had some difficulty in bringing him, for he stated on arriving:—"Le gredin n'aime guère la société des honnêtes gens; il s'accrochait avec ses griffes à tous les arbres et racines qu'il trouvait à sa portée." The inspection of the place, says the narrator, convinced the curious of the truth of his words: shoots of young trees and roots which the bear had caught marked the road traversed by the animal in the grip of this giant of the Laurentides.

Those men were much out of the common, and possessed qualities of physical strength not shared by others; but they are the direct descendants of healthy sires from Brittany and Normandy; and I mention with peculiar satisfaction their possession of strength as additional evidence of the opposite of what Dr. Knox has stated in relation to our climate and its influence.

More than a century and a half ago the remarkable results induced by climate were recognized in a "Memoire sur l'état présent du Canada," dated 12th December, 1715, addressed to His Royal Highness the Duke of Orleans, then Regent of France:—"Les Français qui habitent le Canada sont de corps bien faits, agiles, vigoureux, jouissant d'une parfaite santé, capables de soutenir toutes sortes de fatigues et belliqueux. Ce qui a fait que les armateurs Français ont toujours donné, pendant cette dernière guerre, le quart plus de paie aux Français Canadiens qu'au Français d'Europe."

My very intelligent and observant friend, Mr. Walter Shanley, who has had many opportunities of judging, says: "The French-Canadian can lift a heavier weight than any man in the world. His strength is in the direction of lifting and carrying power. The French-Canadian *voyageur* carries weights across *portages* which Europeans would barely lift, and that with an ease which is astonishing. "I have seen," he says, "a large, strong-looking European unable to lift a large load, when a middle-sized French-Canadian would bear it off with ease." His *eating* qualities keep pace with his strength. He can eat anything you may set before him—from *racines*, of which he is not fond, to *porc salé*, of which he is.

Dr. Hays, in his arctic journeys, found that the Canadian *voyageurs* could carry more, and for a longer period, than the Americans. The average load for quick journeys was 35 lbs. "A very few pounds over weight," he adds, "broke *us* down." Dr. Kane, in his first volume of "Arctic

Explorations," says that to *his* men, chiefly American, a weight of 35 lbs. proved excessive; and he adds:—"The *Canadian voyageurs* will carry much more, and for an almost indefinite period."

The little Scotch colony at Murray Bay, for instance, now become so thoroughly Canadian as to have forgotten both the Gaelic and English, and speaking only French, with whom they are thoroughly incorporated by marriage, is composed of very powerful men—more powerful than their Scotch or French progenitors. The same may be said of those colonists from the Isle of Skye and Inverness who peopled Glengarry three generations ago. Their descendants are much taller than the present inhabitants of Skye—the men averaging six feet and the women five feet eight. Other examples of the stimulating influence of this climate might be adduced, but I select Murray Bay and Glengarry, as the times of settling, and the places whence the settlers came from, are matters free from doubt.

But we have had many evidences of superior height in different parts of Canada. In Ontario, for instance, when, a few years ago, a response was made by the Wentworth Fourth for volunteers, no less than three hundred and fifty of the men who mustered stood six feet and upwards in height, and seven officers in the same battalion were over six feet high.

These, and similar observations met with in the course of reading, suggested to me, while writing, to continue the experiments begun some years ago in the University of Edinburgh by my former Preceptor in the chair of Natural Philosophy, Professor James D. Forbes, and published by him at the time. Professor Forbes, during several years, made experiments upon the physical differences between the English, Irish, Scotch and Belgian students frequenting the University. The results, no doubt, are well known to you. It occurred to me that were experiments

of a similar kind continued among the same class of persons here, we might see if the prognostications of Dr. Knox were, *quo ad* this part of the continent at least, in process of being realized.

I made known my wishes to the medical students at McGill University and the Montreal School of Medicine. The young gentlemen at both institutions entered into the affair with alacrity, and the result I now lay before you. Professor Forbes had ascertained, during a series of years, the height, weight, and *lumbar* strength of the students of different nationalities. I took them as the *point de depart*, and made them the basis for future comparisons. To ascertain the height and weight was easy—a six-foot rule, accurately marked off into inches and half inches; and a delicate platform scale sufficed for those purposes. To ascertain the lumbar strength I had to construct a dynamometer.* The one I caused to be constructed for the experiment consisted of an upright stand, six feet high, with a broad base, secured firmly to the floor. It had a horizontal, moveable beam, into which a tongue, nearly five feet long, was morticed, at right angles to the former. This tongue was heavily loaded. A scale of a quarter of a circle was attached to the lower part of the upright beam, in such a manner as to permit the index upon the end of the tongue to point clearly and distinctly to the graduated scale. One arm of the horizontal beam was gradually loaded with weights, and the position of the index (the, at one time, vertical tongue) was indicated in lines and figures on the quadrant; a pulley was fixed to the pedestal, and the instrument was complete. No allowance was made for friction. There is an apparent objection to this instrument: that as the broad arm descends, the same increase of weight does not move the loaded index through the same cycloidal space. This is quite true,

*The dynamometer was invented by Regnier. It was used by Quetelet, Forbes and others. They are of two kinds.

but it is an objection equally affecting the registration of the weight in the first instance, and of the muscular strength in the second. The result, therefore, is the same, and it was, moreover, the best method I could devise.

In Europe, it is well known [and Professor Forbes confirms it], the tallest and strongest men are the Irish ; the Scotch come next ; the English next, and the French after a long interval.

In weight, the order is somewhat changed, *quo ad* the Scotch and the English—the latter being a few pounds heavier than the former—though both are lighter than the Irish. But the residents of the British Isles (or such portions of them as furnish the educated classes) are much stronger, heavier, and taller than the Belgians or French. The British (English, Irish and Scotch combined) average 46 lbs. more in strength than the French. We shall see if that superiority is maintained here.

I have chosen, in my tables, as the most reliable, the figures furnished by Prof. Jas. D. Forbes, of Edinburgh, which I have incorporated into the text. I knew him well, and his remarkable accuracy in every statement he put forth entitled him to full and entire credence. I have added what relates to the French from Quetelet.*

TABLE EXHIBITING HEIGHT, WEIGHT AND LUMBAR STRENGTH OF STUDENTS, "McGILL" AND "MONTREAL" MEDICAL SCHOOLS.

Height, with Shoes, in Inches.

	English.	Scotch.	Irish.	French.	British Canadian.	French Canadian.
Age 21.	68·8	69·2	70·0	64·0	69·5	67·9
		Weight	*in*	*pounds.*		
" 21.	146	142·5	151	137	150	150
		Lumbar	*strength*	*in pounds.*		
" 21.	392	402	423	..	420	451

* The French statistician Quetelet places the average weight of an adult male at 137 lbs., and the average height at 5 feet 4 inches. I have

The result of these experiments was somewhat unexpected, and I repeated them, aided by Mr. (afterwards Dr.) J. D. Grant, and Mr. (afterwards Dr.) Burland. The results are given so far as recorded. Yet all was not recorded; for not to destroy the average, I was forced to reject three—all French-Canadians—whose strength was so much above the others, that to have chronicled them would have completely destroyed the average I wished to obtain. One (Mr. Eno) was a student at McGill University; two were of the French school. One of the latter (Mr. Lacasse) raised the index to 900 lbs. with the greatest ease, when the rope parted.

The experiments—although in no way decisive, and requiring repetition on a larger and more extended scale—point to the conclusion that the climate of Canada has hitherto not had those deleterious effects which were prophetized. On the contrary, the British Canadian, thougl not yet thoroughly acclimatized, equals *his* progenitors in height, weight and strength; while the thoroughly acclimatized French-Canadian greatly surpasses *his* progenitors in all those several relations.

The degree of lumbar strength attained by the French-Canadian may not at first strike us while looking at the above table. But when it is borne in mind that in Europe the British are 46 lbs. stronger than the French, the increase in lumbar strength, observable here, among the descendants of the same people, must appear extraordinary. It is either an advance of more than 100 lbs. during their resi-

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adopted his estimate. At the University of Oxford, the average height of the first hundred young men, whose names were on the books of the gentleman in charge of the University Gymnasium, was a trifle over 5 feet 9 inches, and the average weight 133 lbs. In America, the average height of the students of Harvard University was found by Dr. Gould to be 5 feet 8 inches, and their weight 139 lbs. The figures furnished by Amherst College are precisely the same. So that Americans would appear to be taller than the French; not so tall as the English; but heavier than either, according to their stature.

dence in Canada; or a diminution of strength of their cousins in Europe to a corresponding extent. And I leave to their cousins in Europe to settle the latter question. Whether, as was suggested at the time, the young gentlemen of one nationality had the faculty of better concentrating their strength, I shall leave to others to determine.

It would, indeed, be difficult to account for this increased strength of the French-Canadians, save on the assumption that they have been longest in possession of the soil—are thorougly acclimatized—and have lived in comfort and contentment.

"Where vice had not yet spread its snares, nor wealth its seductions."

Their dwellings are comfortable—their broad acres place them far above the same class in Europe, and they do not require to

"Force a churlish soil for scanty bread."

The same set of influences has greatly increased the height of the French Canadian people. Or is it that less favorable influences have diminished the stature of the people of France from whom they are sprung? Both—probably both—for the revolutions and wars have cut off the generators of tall men till the standard is much less than formerly.

Here it has been one almost unbroken chain of undisturbed quiet; there dynasty has followed dynasty, sometimes with feverishness and unrest; sometimes with violence; sometimes with bloodshed; but always with disturbance of the quiet of the people. Those changes of dynasty in France have been effected ten times within a century!

Allowing for the operation of opposite influences, it is difficult to explain the difference observed between the progeny of the common sire save by this hypothesis. "Heureux les peuple qui n'ont pas d'histoire," says

Fenelon, and the antitheton may be: "Malheureux les peuples qui en ont trop."

The Canadian peasantry, and particularly the French Canadian peasantry, is the most comfortable in the world. Their clean,* warm, well-lighted houses, generally overflowing with children, contain healthy frames, and happy faces. Whether this cheerful, happy state is the cause of, or is caused by health, is not my purpose to determine; although the reciprocal action of happy hearts and healthy bodies is readily admitted. But the condition of the Canadian peasants, compared with their cousins in France, is one of peace, quiet and comfort. Less wealthy than the wealthiest, they know not the poverty of the poorest, for with them, as with the Acadian,†

"The richest are poor, and the poorest live in abundance."

The above results were obtainable twenty-five years ago. But when I gave a synopsis of those experiments before the British Association for the Advancement of Science, at its meeting in Montreal in August last, in the discus-

* Cleanliness, so conducive to comfort, is in Canada a wide-spread virtue. But this cleanliness is not so much of the body—which is not made to suffer from too frequent bathing—as of the linen which covers it. On this subject M. de Gaspé says:—"Je dois observer ici qu'il y a probablement peu de peuples aussi propres que le sont nos Canadiens maintenant; les pauvres femmes, même lavent leurs planchers tous les samedis, et toute leur famille met du linge blanche au moins une fois par semaine. Je connais des femmes pauvres qui font coucher leurs enfants le jour le samedi, pour laver leur seule et unique chemise." There are no visits on that day, and woe to the visitor, male or female, but especially female, who interrupts the Saturday's work. Her accustomed patience and politeness cling not to an unwilling entertainer." Canadians are usually very fond of dancing, and the long winter evenings are enlivened in this way. In our cities the fashionable dances are indulged in with all the grace of Paris or London. But in country districts, where "the sinews of the legs are strong," they are used with a will.

† Mr. McGregor finds resemblances between Nova Scotia Acadians and Canadians in their "industry and economy, gayety at festivals, attendance at church, purity of morals, early marriages and large families of fat, chubby children."

sion which followed, doubts were expressed by a Canadian member (doubts are always expressed on such occasions) as to the reliability of the figures—certain errors, to which it is unnecessary to refer, being suggested as possible. I resolved to repeat the experiments, leaving to a committee, as in the former instance, to record the figures. I obtained the cöoperation of the French-Canadian students of my clinical surgery class at the Hôtel-Dieu Hospital; and, for the English-speaking, I was courteously favoured by Dr. Shepherd with an opportunity to lay the matter before the students of his anatomical class in McGill University. The young gentlemen of both schools received the proposal with acclamation. Dr. Gurd (Secretary of the Medico-Chirurgical Society) and Mr. Barnjam (of the Gymnasium) kindly undertook to watch and superintend the experiments. I added, on this occasion (1) the precise age of each student (I did not draw an average—as on the former occasion, making same allowance as in the Edinburgh returns, and reducing to twenty-one years); (2) the number of generations born in Canada, on side of father and mother; and (3) the birth-place of both parents. Unfortunately, the experiments were delayed till a late period of the session (middle of March), when the students were engaged in preparation for the approaching examinations—examinations which, in fact, took place before the completion of the experiments. It will be conceded, I think, that the severe mental labour and anxiety undergone by medical students in preparing for their examinations, are not a good preparation for a trial of muscular strength. Had the trials taken place in autumn, when the students were fresh from their homes in the country, the record—splendid as it really is—would, I am sure, have been still more remarkable

On a former occasion it occurred to me that, in lifting weights from the ground, men of short stature had an advantage over taller men, depending, as Mr. W. E.

Doran puts it, on the lesser deviation they are obliged to make from their respective centres of gravity in stooping to the object to be lifted, as the further removed a man becomes from his own centre of gravity, the greater exertion will he require to lift a weight, and at the same time regain his equilibrium. That objection might, perhaps, be brought against the former experiments; but on this occasion the position of the body was the same, whether the person were tall or short; and the sudden or spasmodic force of lifting was not registered, but the force of *sustaining* or *carrying* power. Under Mr. Barnjum's directions the chest was thrown forwards; the stomach backwards; and the knees were strongly flexed. It was the straightening of the latter, in short and tall men alike, and to a like extent, which lifted and *sustained* the weight.

TABLE SHOWING HEIGHT, WEIGHT AND LUMBAR STRENGTH.

NATIONALITY.	Age.	Average No. of generations born in Canada.		Original birthplace of Parents.	Height in inches.	Weight in pounds.	Lumbar strength. Lbs.
		Father.	Mother.	Father. Mother.			
British Canadian....	22·1	3	3	Great Britain.	70·09	155	473·1½
French Canadian....	22·5	10	10	France.	67 9	155	499·3

In recording this splendid average, I record, at the same time, my sense of the kindness and alacrity of the young gentlemen who enabled me to obtain it, in giving, in their own persons, such convincing proofs of the healthiness of our climate. This table differs in no material respect from that of twenty-five years ago. The increased height and weight of the British Canadian are accounted for by the increased age—a difference of over one year. The increased weight of the French-Canadian is due to the same cause; while the considerable increase in strength, in both nationalities is due, I think, to Mr. Barnjum's attention to the position of body of the young athletes. These figures show an advance in height, weight and strength of three generations of British Canadians

born in Canada; and in at least an equal ratio, an advance in height, weig' and strength of ten generations of Canadian-born French.*

At the moment, I have not at hand any figures relating to the height of the French people, but I have the authority of Dr. Bell for stating that out of 1,033,442 young men drafted in France recently to serve in the army, 380,213, or more than one-third, were sent back because they fell short even of the diminutive stature of 4 feet 10 inches French measure, or about 5 feet 1 inch, English, or 6.9 inches less than the average height of their Canadian cousins, as represented by the student class.

In fine, what can be safely entertained regarding the climate may be summed up thus: After a longer or shorter residence in Canada the constitution of Europeans becomes acclimatized, it suffering, in the meantime, no inconvenience, unless bad habits have attended a change of residence; and the offsprings of those Europeans, after a few generations attain a size and strength superior to those of their sires, when peace, comfort and plenty attend.

Weight at Birth.

I have to direct attention to an interesting circumstance mentioned in the report just issued of the University Lying-in Hospital of Montreal—and which I first noticed in the *Medical Times and Gazette* for Saturday, 23rd February, 1879—a circumstance which has also arrested the attention of eminent accoucheurs in Great Britain. It is the custom, in lying-in hospitals, to record the date of birth, sex, length, weight, etc., of the children born within their walls. The average recorded weight

* The number of generations of French-Canadians was more or less conjectural. The usual answer to the question: "How many generations born in Canada?" was: "Dès le commencement." With certain families there have been but eight generations from 1640 to the present; with others there have been thirteen or more. Ten generations, therefore, may be regarded as a fair average.

of the children born in the hospital in Montreal is, at birth: males, *seven* pounds thirteen ounces; females, *seven* pounds eleven ounces. Dr. Godson, in commenting on this report, stated that he had recently weighed a number of children delivered at the City of London Lying-in Hospital, and had found the weight of the males averaged *six* pounds thirteen ounces, and the females *six* pounds ten ounces." If the figures furnished by those two lying-in hospitals are to be taken as correct, the children born in Montreal average a pound more than those born in London! * If, then (always supposing the record to be correct), the children here are, when born, so much larger and heavier than the children born in England, why should they not continue to keep in advance through life, when so favourably handicapped at the outset? † Has the stimulating air of Canada aught to do with this; or is it the exterior comforts of parents?

The stimulating influences of a Canadian climate in developing muscular strength at an earlier period than in any part of Europe is noticeable among many tribes of the aborigines. It is remarkable, for instance, that children of a very tender age among the Chippewyas, and other tribes, join in the long and fatiguing marches of older people. Simpson relates that among the Indians who came to the Copper-mine station to meet him was a family, the youngest member of which, a boy, scarcely two years old, and still unweaned, walked on snow-

* I was anxious to verify the statistics of the Montreal Lying-in Hospital by those of Toronto; but a medical friend in the latter city to whom I wrote for information, replied: "I visited the Lying-in Hospital and examined the records, and they contain nothing about weights or measurements. The matron had sold all the old books and records." My friend adds: "I am ashamed to send this information, but you have it as I received it."

† The children born in some parts of the United States do not weigh as much as those born in Canada. The average weight, for instance, of children born in the Philadelphia Hospital is 7 lbs. 4·88 oz.: the average of the boys is 7 lbs. 7·954 oz. and of the girls 7 lbs. 1·725 oz.

shoes! "I had the curiosity to measure them," says the narrator, "and found their dimensions exactly two feet in length, including the curved point, by six inches at the broadest point. The little urchin was so fond of those painful appendages that he hugged them as a plaything, and bawled lustily when his mother attempted to take them from him."

The Voice.

Strong voices are not always associated with strong bodies; but the possession of powerful voices by a whole people may not unfairly be taken to indicate their health and strength.

Every Canadian woman can sing, or does sing; but her voice is not always good, being too loud and shrill.* She sings when working, and her song is energetic and animated; she sings of her *cavalier*, and it is more plaintive and uncertain. But he having become "mon homme," her song is now softer and more endearing when coaxing her little one—and she has always a little one—to sleep. She sings, too, when her mind is idle, though her hands may be busy, for "ce qui ne vaut pas la peine d'être dit, elle chante." Some of the songs are a continuous screech, without melody or rhythm; while others are very pretty, and remind one of the *chansons* of Normandy, whence they are in measure derived, and do not always suit Rousseau's false and ill-natured definition of French song: "Ennuyeux et lamentable chant français, qui ressemble aux cris de la colique mieux qu'aux transports des passions." But this loud screeching is the result of faulty training. Children joining in chorus-singing at school are allowed free scope to the vibrations of their vocal chords; and she who can screech loudest, and clearest, and shrillest, is she who is often considered to sing best.

The voices of the men, on the other hand, are, with occa-

*Oliver Wendell Holmes finds that the women here are more like squaws in speech; that French women sing badly, but the men well.

sional exceptions, sonorous and powerful. The baritone usually predominates; and the basso is more frequently heard than the tenor.

When educated,—as in the case of a Mme. Taschereau, Mme. Robert, Mme. Christin or an Albani, or a Mlle. Villeneuve, among the women; or a Harwood, Lavoie, Lamothe, Ducharme, Lefebvre or Maillet, among the men;—they give evidence of sweetness, but also of great power. This can be met with only in the deep-chested, and in those of good digestion.

This powerful voice of male and female—needing for its production a healthy condition of the respiratory muscles, of the lungs, trachea (wind-pipe), and of its cartilaginous cavity, "of the pharyngeal, oral and nasal cavities, and of the nerves and nervous centres on which these parts depend" for their movements,—is additional evidence of tone and of power in the system, resulting, in some measure at least, from climate.

Nasal Speech.

Although somewhat foreign to my subject, I cannot refrain from alluding to that quality of voice which has come to be regarded as a national characteristic with our near neighbours; and also with ourselves in certain districts.

Squaws generally speak with a nasal twang and sing through their noses; and the men have not the sonorous voices of the negroes. But the structure of the nose in some measure accounts for the difference. With the negro the nostrils are wide and roomy; the Indian's nose, though classically formed, is narrow.

But the white man has not copied the Indian. He brought with him to this country that but little agreeable peculiarity of speech; and immigrants, who wished to be considered American at once assumed it on their arrival. So the nasal twang was as the nasal twang of the Puritans, which, with their "ostentatious simplicity

of dress, their sour aspect, their stiff posture, their long graces, their Hebrew names, the scriptural phrases which they introduced on every occasion, their contempt of human learning," as Macaulay says of them, were as external badges to distinguish the most remarkable body of men, perhaps, which the world has ever produced. If so, the nasal tone has exhibited more tenacity of life than have many of the other characteristics.

But the nasal twang is not of so recent date as may, by some, be imagined: for in England, in the reign of Edward III., when English was not generally taught in schools, children, to learn their own language, were compelled to be sent into France, to "polish their *nasal* Norman," as a writer of the period complainingly remarks.

Was the nasal twang a characteristic of refinement at that period, as, 400 years later, it was regarded as an outward sign of inward spiritual grace? It would appear not; for, even in France, it was but a dialect; and the river Loire limited it, and limited, at the same time, the vowelly softness where it "gave way to a harsher idiom and a sharp nasal accent."

The nasal twang is, with many, merely a trick which may be performed at pleasure by the voluntary action of the muscles of the palate which close the nose from behind, and has no relationship whatever to climate. In many families it has been observed that some members speak in this manner, and others in the usual way.

INTELLECT.

And what can we say of the mind? Is the Canadian people, in its fullest homogeneity, to advance or to recede in intellect? There are many who believe, or profess to believe, that the human family long since reached its highest degree of mental excellence, and point to the works of the ancients in illustration. Where is the poet like Homer; the orator like Demosthenes; the physician like Galen; the law-giver like Solon? I have the most

profound respect for those names which have so long outlived the lives of those who bore them. But the belief that humanity is on the decline—that the energy of man is decaying—that the heart is becoming harder, and that imagination and intellect are dwindling away —"lays an icy finger on the soul, confirms the most debasing selfishness, and tends to retard the good which it denies." It does, indeed, appear to me, as if the mind of the Canadian people has become more fertile in improvement than in invention, and altered circumstances, bringing with them a new set of influences, are sufficient to account for the change. But many believe that the cold winters (which are sufficient to sharpen the intellect—as they do the appetite—without dwarfing or shrivelling the thinking faculties of our nature,) and the warm summers (which are not sufficiently long to depress and enervate) have contributed to this end, for

> ". . . not alone the southern wit sublimes,
> But ripens spirits in cold northern climes."

Malte Brun, from whom Alison loves to quote, draws a horoscope thus :—"Canada, and the other British possessions in North America, though apparently blessed with fewer physical advantages, contain a noble race, and are evidently reserved for a lofty destination. Everything there is in proper keeping for the development of the combined physical and *mental* energies of man. There, are to be found, at once the hardihood of character which conquers difficulty ; the severity of climate which stimulates exertion ; the natural advantages which reward enterprise. Nature has marked out this country for exalted destinies."

And yet the Canadian mind has not, till recently, been exposed to circumstances requiring the *highest* attributes of mind—for, till recently, the struggle—the attrition—has not been of mind against mind ; but of mind and body, and even of life itself, against the natural principle in its

aggregate phenomenon, as observed in nature in this new world. Pothier truly observes:—"Il en est de l'esprit comme du corps, faute de l'exercise qui lui est propre, il perd l'usage de ces facultés qui s'engourdissent dans l'inactivité." It may be admitted, as a general principle, that old established societies are alone prolific in philosophy and criticism ("les vielles sociétés seules sont fécondes en philosophie et en critique"); though solitude in their midst is indispensible for literary pursuits, and without it no considerable work has yet been composed. But solitude in the midst of refinement is reserved in Canada for future generations, when wealth shall have secured leisure, and refinement opportunity. There is danger, however, that as the civil life becomes refined, and the political life developes and assumes shape, and man builds cities and calls the places after his name, "the moral life," as Alison believes, "may become weaker, ancestral virtues decay, and even the sanction of religion be less regarded,"—changes, undesirable as they may be, are already to be noticed in the chrysalid form of Canadian society scarcely developed from the stage which preceded it.

It is impossible, as yet, to treat of the Canadian mind otherwise than as we observe it in the French-Canadian people. The less imaginative and more serious Teutonic Canadian is yet so recent—and still partakes so completely of his European progenitor, from whom he is continually receiving new accessions—that the shades of difference are not sufficiently marked to enable us to delineate them clearly. Here and there, however, among the descendants of the *earlier* settlers, we notice a departure from the original standard—not in the voice alone, nor in the general physique; and not alone in that preternaturally developed individuality and self-reliance which are so marked; but even in the subtler qualities of mind. So far, it would here seem, the stern realities of life are not favourable to the development of poetic qualities.

Nor are they more favourable in the adjoining Union. In the American mind, as exemplified in the best writers, we may admire a happy facility of expression—a mature, ripe, solid, and sagacious reasoning;—a freshness and originality in representation; but there is, at the same time, an almost entire absence of poetic imagination. The earliest writers display a style which is characterized by extreme simplicity, but, at the same time, an almost total absence of imagination idealized. Franklin's writings exhibit as little power of imagination as do those of Washington, Jefferson or Quincy Adams. Prescott and Washington Irving, in our day, have exhibited a few brilliant flashes of imagination; but they are not racy of the soil, and might have been struck with equal *vraisemblance* in London, Paris, Dublin, Moscow or Madrid; and but for Longfellow and Cooper, imagination in the American mind might be said to have rested mute in the presence of forests of magnificent grandeur, and peopled with an infinite variety of animals; lakes and rivers of surpassing size and interest; cataracts of indescribable beauty and magnitude; and an indigenous people, coëval with the forests, and now rapidly disappearing with the trees that gave them shelter, and the *wilde* that gave them food. Nor is language wanting to give expression to that sentiment, unless, indeed, a more perfect language, and a higher order of poetry are required to its embodiment.*

The poets of Canada, unlike those of other countries, often dwell less on the climatic features and the beauties of a physical organization than on trifling incidents of political or social life.

* Dr. Faust, writer of a sketch of John Howard Payne, author of "Home, Sweet Home," says:—"Of all the songs endeared to us by early and familiar association, there is not one that Americans can claim exclusively except this. Tender old ballads by the score we borrow from the Irish, Scotch, English and German, but of our own there is but one." Of Canada, in this respect, thanks to Crémazie, Lemay, Frechette, etc., much more could be said.

It may be questioned if the present state of Canadian society is favourable to the creation or the fostering of genius.*

Poetical genius derives no advantage from the surrounding civilization or from acquired learning. Macaulay thought that, as "civilization advances, poetry almost necessarily declines"; and that a "great poem produced in a civilized age is the most wonderful and splendid proof of genius."

French writers are always ingenious in theory, and W. Philaiste Chasles is not an exception. "Il semblerait," says he, "que le climat de l'Amerique Septentrionale eût déja exercé sur les fils des puritains une action qui les approcherait des anciens habitants des forêts Americaines. La predilection pour les grandes images et les vastes metaphores l'annonce de la vie errante; la froideur dans lés relations entre les deux sexes, froideur mêlée de dignité, semblent des caractères empruntés aux aborigènes, soit que la temperature ait modifié la race Anglo-Saxonne, ou, que l'example des peaux rouges ait été contagieux. Dans les romans les plus remarquables de Cooper, le sauvage rouge et le squatter se touchent, ou plutot se confondent."

He who can live, eat, drink, sleep anywhere, becomes attached rather to the sky—his canopy at all times. Here, however, the fireside and its attractions and accompaniments are, as it were, the altar of the Canadian's devotions; and by a deprivation of these he loses the incentive

* Sir Cusack P. Rooney published in *Saunders' News Letter* (July 16th, 1883,) a very pretty appeal to his countrymen to take up their abode in Canada—and held out, among other inducements, the following:—"I am assured," he says, "that Irishmen make better lumbermen than the natives of any other country; for it appears that the good and abundant food they begin eating from the moment they arrive, expands not only the muscular frame, BUT ALSO THE INTELLECT." As lumbermen live chiefly on pork, with peas and bread, it would be interesting to know to which Sir Cusack attributes this power of "expanding the intellect." The theory is a novel one, truly.

to much that is good. The titles to some of the most interesting periodicals of the country are illustrations: "Le Foyer Canadien," "Les Soirées Canadiennes," "La Revue Canadienne," and others, recording many home scenes which linger in the memories of the people.

It is this fireside influence which has created in the French-Canadian woman, especially, those qualities of mind as well as of heart, which eminently fit her for the management of her numerous household duties, including, sometimes without his knowledge; sometimes perhaps with his entire assent; but commonly to his advantage, him who is nominally the head of the household.

I believe I am not wrong in stating, what has been noticed by many observers, that Canadian women, of the humbler classes, are, as a general rule, more intelligent than the men.

It is so likewise among the aborigines. In the extreme north, Rae found that women alone could draw a chart that was at all intelligible to him; and that circumstance induced him to state: "The women, as is usual (at least among the Esquimaux), was much the more intelligent of the two."

The information obtained from the Esquimaux was usually correct, but most correct was that furnished by the women. It was from the women Dease and Simpson procured sketches of a country through which they intended to pass. The women could draw bays and inlets; mark the position of rivers; and place, with great accuracy, the projections and indentations on the coast.

Among the *habitants*, I have often noticed her superiority to the men in intelligence. The latter do the work; the former the *menage*—which means all that pertains to the management of the house, and its occupants, and its surroundings, including its nominal head. It is only when educated that the husband attains his rightful supremacy. This remark applies in a more especial manner to the *habitant*.

In buying and selling, a *habitant* would not think himself safe to enter a notary's office unaccompanied by his wife; and those gentlemen of the pen tell me the woman, especially the Norman woman, is readiest in detecting a clause or sentence which might be made to bear a construction at variance with her interests. She sees it at once; he, after it is pointed out to him.

But her whole unmarried life—usually, indeed, short—is probationary of her moral trial of after married life.

While the Canadian maiden seems not to guide, nor to think of, or for herself when her parent is near to counsel her (for of the French-Canadian girl it may generally be said: her voice is seldom raised in her mother's presence), to the same maiden, when a wife, there is, at once, on the part of the husband, an "absolute yielding of obedient devotion." He is content, and wise is he, if content, to receive from her, however young, and to continue to her, however old, not only the encouragement, the praise, and the reward of all toil; but so far as any choice is open, or any question difficult of decision, the direction of all toil. Her gentle counsel he can ever trust. This is a state of society which finds no need, no room for woman's rights —a state, as Ruskin remarks, "observable in Christian ages which have been remarkable for their purity or progress." The Canadian woman rules without seeming to rule. She orders, arranges, decides, without vain pedantry or awkward ostentation. She good-humouredly permits *mon mari* to talk, and even to boast, if he chooses, while she is silently knitting or sewing, for she is never idle; but a prompt, quick, ready and opportune remark, kindly given, kindly received, shows an intellect for "sweet ordering, arrangement, and decision." Surely Ruskin must have had her in his mind when he wrote: "The stars only may be over her head, the glow-worm in the night-cold grass may be the only fire at her feet, but home is yet wherever she is; it stretches far round her, better than ceiled with

cedar, or painted with vermilion, shedding its great light far, for those who else were homeless."

But it must be admitted this seemingly happy relationship of husband and wife has often a tendency to make the men less generous, less public-spirited, less interested in the welfare of those beyond the little home circle: for as the wife is, in the last instance, the chancellor of the joint exchequer,—the dispenser of what is necessary for the wants of the family,—many an act of spontaneous heroism, of self-negation, of generosity, or of self-sacrifice on the part of the husband, when it is to assume the form of expenditure, is shorn of its proportions by her whose thoughts go not beyond the children and their actual or possible requirements.

ART.—It would not be saying too much to observe that, in art, Canada, at the present moment, is in advance of Great Britain at the time of Sir Joshua Reynolds, when national incapacity for painting, as Beechey observed, seemed "peculiar to the artists of the soil;" and where climatic and social conditions were then invoked to explain the circumstances, mentioned by his biographer, that Great Britain was deeply indebted to foreigners for what it had witnessed of genuine art. A national academy of painting, such as we have now in Canada, would, at the period referred to, have been impossible, before the example of a Flaxman or a Reynolds showed a national want, and raised native artists to action. Yet little more than a hundred years have gone by since then, when, on the one hand, England was already Old England; and, on the other, the present chief seat of our Canadian Academy, with its magnificent structures, scarcely contained a habitation save that constructed by the beaver for its winter home. We have already, in Canada, a well-marked taste for art, which gives evidence of the advantage of being recruited from the land of those "foreigners" to which Great Britain was formerly, and still is, so largely, in-

debted; and from Great Britain itself which shows such substantial and intelligent appreciation of art.

It is yet too soon to speak of a Canadian school of art, as we are accustomed to speak of a Flemish or a Spanish school; but with a taste for art largely permeating the masses of the Canadian people, and with surroundings in nature so grand and so majestic, art will doubtless be advanced, and the votaries to it well countenanced.

EDUCATION OF YOUTH.

I have elsewhere recorded the superior physique of the new-born infant in Canada; and the subsequent more rapid development of his muscular system. It is undoubted the brain and nervous system here participate in that early and rapid growth.

It has often been a question if the course of study in youth, and the severe mental labour to which young persons are here subjected in certain states of society, do not too hurriedly develop mental activity, ere the nourishment from within would warrant any considerable drain upon the growing brain tissue..

Of young America thus nourished, and to a certain extent of young Canada, it may not always be said that the maturity of intelligence is as the sun, more brilliant, more majestic at his decline than at his rise.

Dull heavy children are rare amongst us, and still rarer among our American neighbours. But while American children are much, very much brighter and smarter than children of the same age in any part of Europe, how is it at sixty? Medical writers, or such among them as recognize the fact "that mental phenomena are manifestations of life,"—and their laws are derivatives of the laws of life,—have lately been denouncing the forcing process to which children are subjected in our public schools—a system vicious beyond expression, and carried on in seemingly entire ignorance of the fact that the growing mind, the nascent intelligence, are connected with a nervous

mechanism, and must be considered "in connection with the organism by which it is conditioned;" for all impressions made upon the brain, and all actions occurring within it, are accompanied by physical changes. Thought usually goes on so quietly, and seems so far removed from bodily activity, that we are betrayed into the notion that it is carried on in a region of pure spirit; but this is far from being the truth. The changes of states of consciousness, the course of thought, and all processes of the understanding, are carried on by a constant succession of nerve excitements and nerve discharges. The brain is not a chaos of parts thrown together at random; it consists of hundreds of millions of cells and fibres, organized into symmetrical order, so as to produce innumerable connections, crossings, and junctures of exquisite delicacy.

In general terms it may be said that the mind of the child is connected with a nervous mechanism, indescribably delicate in structure, which controls and governs all the other functions of the material body as well. Mind, therefore, cannot be separated from the organism by which it is conditioned; and every emanation or action of the mind, or operation of the understanding, is caused, or accompanied, or followed by certain physical changes,—call them what we may—a succession of nerve excitement, of nerve discharge, of nerve waste.

For many years, but more particularly during my occupation of the mayoralty of the city, present, as I often was, at school examinations, I was amazed at the extravagant expectations formed by parents, and assented to, grudgingly, I have no doubt, by teachers; and to satisfy which the mental powers—memory, intellect, even—were often in a state of undue tension. Physicians can tell what often follows that condition. The carefully *maturing* process is neglected; and a smartness,—a quickness in answering is encouraged. The examinations on these

occasions are necessarily short, and the answers to questions must be rapid. But what can be more absurd than to expect that *all* the children in a form shall give precisely the *same* answers, and in "the same terms at precisely the same instant of time." "No system of education," says Dr. Whewell, "which is governed entirely or even mainly by examinations, occupying short times with long intervening intervals, can ever be otherwise than rudimental discipline. Intellectual education requires that the mind should be habitually employed in the acquisition of knowledge, with a certain considerable degree of clear insight and independent activity."

Is it not the experience of every grown person who has been subjected to the *cramming* process, as this must be called, that at the end there is disappointment. And who does not recognize with Bain that the "system of cramming is a scheme for making temporary acquisitions, regardless of the endurance of them. Excitable brains, that can command a very great concentration of force upon a subject, will be proportionately improved for the time being. By drawing upon the strength of the future, we are able to fix temporarily a great variety of impressions during the exaltation of cerebral power that the excitement gives. The occasion past, the brain must lie idle for a corresponding length of time, while a large portion of the excited impressions will gradually perish away."

This system is exceedingly unfavourable to *permanent* acquisitions. For these the brain should be carefully husbanded, and temporarily drawn upon. Every period of undue excitement and feverish susceptibility is a time of great waste for the plastic energy of the mind." Accordi to much of our school system there is little mental economy observable, and brain power is wasted as if the supply were not limited. As, therefore, the child has but a limited amount of brain power, it should be apparent

that the useless waste of it should be guarded against with every possible care.

As a certain amount of power is requisite for the creation or manifestation of all phenomena, to economize, direct, govern and husband that power is a necessity of a healthy existence. It is stated by Lord Brougham, and I believe it firmly, that a child acquires more real knowledge in the first two years of his observant life than in the whole subsequent period of his existence. It follows that the brain power utilized for the purpose must be far in excess of what youth, or adult, consumes in any effort he may make when the phenomena taking place around him have already begun to be understood; and not when thought is being aroused, and the mind is being led out, as it were, into a due appreciation of those phenomena. How unfair, therefore, to draw still more largely upon that already rapidly disintegrating brain tissue, and relieve it unnecessarily of its constituents when "the whole plastic power of the brain is devoted to the storing up of perceptions . . . . when curiosity is freshest, and the perceptions keenest, and memory most impressible, before the reflective powers have attained maturity."

"How the mind is teased and pleased, bewildered and weakened, fatigued and tormented, while the heart is unconsciously experiencing a process by which its honest sensibilities are blunted, and its affections disordered, if not absolutely vitiated, thousands and tens of thousands of the loveliest and most pitiable of our fair countrywomen can tell."

And with special reference to the gentler sex,—in the education of which all the hopes of the future depend,—let me cite to you the words of an observant writer in the United States (Prof. Hodge, of the University of Pennsylvania,) on this subject:—"The nervous temperament of women of the present age has been greatly developed by the wonderful increase of the indulgences and luxuries of

modern life. The physical education of the girl has been most carelessly and thoughtlessly disregarded; while every stimulus has been applied to procure a precocious development of the mind, the heart, and the passions. The organic life has been neglected, while the animal has been unduly and too rapidly excited."

But this question is of so extensive a nature that I can do no more than barely allude to it here. Dr. H. Howard and Dr. Clark, the medical superintendents of Longue Pointe and Toronto asylums, and Dr. Grant, of Ottawa, have written on this subject, and I direct over-ambitious parents to the papers of these gentlemen.

I shall, however, state that the conservative influence which parents, and particularly mothers, throw around their children, is, in certain classes of society, too early laid aside; and the child is too early permitted to select its own pabulum, to draw from what soil it pleases, the aliment for its young mind. In this climate, where intellect seems to outstrip the body in the quick race to maturity, jealousy, pride, ambition and passion are too often aroused to make the child superior to its years and, at the same time, superior to other children of like years. And in this way attention is directed to the intelligence more than to the heart. When this selfishness is awakened too early, and therefore too suddenly, and when it becomes, as it too often does, the chief incentive to study, nervous impressibility is unduly stimulated. There is little danger that parental, and more particularly maternal, tenderness will continue long enough to interpose itself between the child and the stern realities of life to enervate the character or to rob it of its manliness, its shrewdness, its smartness, its self-assertion—angularities ill-befitting the little child in which we should more willingly look for mildness, gentleness, reserve and trust.

It is asserted, and not without reason, that the relatively restricted mental action of youth in Europe is

favourable to a tardy, and, therefore, to a more lasting development of mind in manhood. In Canada the youthful mind occupies an intermediate position between the wisely slow of Europe and the preternaturally forced intelligence of the United States, with every year, however, on our part, a steadily increasing tendency to the latter. Is it desirable? I cannot now answer in the affirmative.

It may seem somewhat out of place to do more than to allude to this faulty system of school, home and society education; but the question must be considered in any essay on our climate, and on its influence on our minds and bodies.

CERTAIN CHARACTERISTICS.

To return, however, to the white occupier of the soil—a word as to some of their characteristics:

While the French-Canadian resembles *au fond* the European progenitor, the character has been moulded here by circumstances not alone climatal. It is asserted that the French-Canadian is less influenced by sentiment and more by reason than his European cousin. Even the proverbial levity which is supposed to be the national characteristic of the French, yields somewhat to a sobering influence which this climate exerts. He is here less volatile; less variable in his tastes; less subject to his passions; less easily roused; less easily subdued; and for those reasons less open to error, and even to a truth with which he was not already somewhat familiar. While a Frenchman listens with mouth and eyes as well as ears; the Canadian shrugs his shoulders at what he has difficulty in believing or understanding—a most expressive pantomime which politely implies distrust, or disbelief, or indifference. It might, *à priori*, be expected that a difference in circumstances, operating through a long succession of years, would influence a too prominent feature in the external character of the Canadian branch of the

European family. But it is not so, for jealousy of each other has here, alas! as in France, its share in his composition; and education does not check it; and common interests and a love of a common country do not enable him to put aside.

In Europe every revolution has had its influence in convulsing society, and in developing or modifying qualities of mind; here, on the other hand, there has been one almost unwritten history. There, revolutions and changes of dynasty, each one disturbing society, and calling forth qualities that were hitherto latent; here, in Canada, one partial movement, since called, and admitted to have been, patriotic, alone attests former discontent; and now, after many years of happiness, few among those who were then, with reason, discontent, would be found to desire, even, still less to hope for a change. And let that change—which some style inevitable—come when it may, the French-Canadians would admit it as an unwelcome guest which they were no longer able to thrust out.

For what is wanting in our social relations? Is it freedom? No country in the world has more (and no country in the world prizes it more highly) freedom—liberty—that liberty which is not the fruit of warm climates (which maintain free governments with difficulty); but the freedom of a northern people having within themselves all the elements of a high-prized freedom.*

But let it not be supposed, from what I state, that the French-Canadian partakes, in any considerable degree, of that "cold phlegm and exact regularity to sense and humour." He is, on the contrary, like Sterne's friend Yorick, as "mercurial and sublimated a composition, as

* How different is theory from reality, and how little, sometimes, are the prophesies of historians and writers realized. The Constitution of 1791, which gave representative institutions to Canada, was supposed to place her in great danger of rebellion or separation. But how vain were

heteroclite a creature in all his declensions, with as much life and whim and *gaieté de cœur* as the kindliest climate could have engendered and put together." It is sometimes made a reproach to them that they live too much among themselves and preserve too much their native characteristics; but these are reproaches which might, with equal truth, be made against any people separated by language from those around them.

In French Canada the attachment of the *habitant* to his home is very strong,* and offers a barrier, to some extent, to his material advancement. His ambition is to leave "*une terre*" to each of his sons; and instead of extending his labours into the surrounding wilds, and redeeming them from their savage state, he, while yet in health, divides and subdivides his freehold among them, and his progeny soon covers it with theirs. The farmer of British origin is more of a nomad, and has no such attachment to the land he has acquired by purchase or by labour. He sells his property as readily as he does his corn or his cattle, and migrates from one spot to another with so little hesitation, and often with so little regret, as to have led observant writers to conclude that "emigration may be considered as his grand social characteristic."

Although, in Canada, the law permits the parent to distribute his property as he likes,† he rarely divides it other-

their prophesies when, twenty years afterwards, "forty thousand effective militia in arms were ready to defend their territory from invasion." At a later period, when a partial movement to obtain responsible government assumed a violence—short and spasmodic—which its promoters did not intend, the thought of separation did not occur. And when, still later, a hostile demonstration took place along our southern boundary, no sympathy went forth from any section of our people, but bayonets bristled along the frontier to repel the unwelcome intruder.

* I know no scenes more affecting, and more illustrative of those strong attachments, than are witnessed when a St. Jean Baptiste Celebration brings thousands of the expatriated to revisit their *foyer* for a day.

† This is only a local truth, as in the Province of Quebec the wife is mistress of one-half her husband's property, if not arranged otherwise before marriage.

wise than equally among his children—the first-born sharing equally with the rest. The French-Canadian leaves for greener pastures only when crowded out, and when his *petite terre* is not sufficient for the ever-increasing number of mouths; the British Canadian sells his property when he can do so at a profit. The former is ever anxious to turn money or labour into land; the latter is never averse to turn land or labour into money. And, however long and happily he may have lived upon his little domain: though it may have been "the playground of his infancy; the arbour of his wedded love; the nursery of his children: though it may be endeared to him by all the ties which can bind man to material nature, and the remembrance of which, in other countries, constitutes the last drop in the cup of the vanquished," he sells, or pulls up stakes, as the vernacular has it, and finds his way to a distant part of the country, or perhaps to the transatlantic home of his ancestors—never to return. Hereditary feeling is much stronger with the French-Canadian; and when he is forced by circumstances to leave for elsewhere, it is not to remain there. As he earns, he sends money to his native Canada to buy "*une terre*," or to redeem what he has from debt; and his song is ever: "O Canada! mon Pays! mes Amours!"

CONCLUSION.

I have endeavoured, my lord, ladies and gentlemen, as fully as time would permit, to trace the relations which subsist between the climate of this country and the life and health of its people; and I have proved, I trust conclusively, that this climate is favourable to the highest development of a healthy, long-lived, intelligent people. Statistics already prove the climate to be favourable to health and life; time will show it to be favourable to mental development,—the *mens sana in corpore sano*—for it can hardly be doubted that here, not less than among the peoples of the North American free states (and Canada is as free as the freest among them), all the conditions exist, as Liebig says, for the development of the highest point of culture and civilization attainable by man. And surely no one will be bold enough to assert—and especially in view of certain facts I have already stated—that even a better *physique* is not here attainable; or that the limits of human wisdom and human intelligence must be estimated by their present attainments. The history of this country is still too short to predict much in regard to *physique;* but what has been adduced is unmistakably in favour of increased muscular development, or, more correctly speaking, I think, of density and strength of muscular tissue; and with it, *pari passu*, of mental vigour,—more important still,—for if "on earth there is nothing great but man, in man there is nothing great but mind."

It is not for me to determine whether the descendants of Frenchmen, Englishmen, Irishmen or Scotchmen will eventually hold the soil. That is a question which will be regulated by those modifying influences of soil and climate and other external circumstances, ever operating, however silently, in moulding and shaping the character not less than the countenance—no matter what Dr. Knox

may have said to the contrary.* I have no doubt we will yet see worked out in this country what has never happened in the Old World—the complete amalgamation of several distinct races, with, at the same time, the utter destruction of the aboriginal population, except where, here and there, to a limited, yet to a visible extent it will have stamped some of its more characteristic and permanent features upon the conqnering peoples. There are circumstances favourable to such an event here, which were wanting in Europe.†

It would seem to have been the condition of permanent dominion elsewhere, as Merivale says, that conquerors should absorb the conquered gradually into their body, by extending, as circumstances arise, a share in their own exclusive privileges to the masses from whom they have torn their original independence, but in peaceful Canada it is not so.

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* Dr. Knox was of opinion that the true Saxons or Germans are identical with those of antiquity, and that climate exercises no influence on them—an opinion I am at a loss to understand. What! a hot climate may alter the health; wither up the frame; render the body thin and juiceless; waste the adipose tissue; relax the muscles; darken the complexion; tinge the blood and the various secretions; indispose to physical or mental exertion, and yet produce no permanent result on the intimate structure of the body, or upon that faculty which animates and controls it!!

† If the writer in a recent number of the London *Daily News* (April 3) is at all correct, it would be better, perhaps, that this mixture should not take place, for, however curious it may seem, it has been asserted, in a comment on the death of Lord Leitrim, that almost all the more violent crimes which mark Irish society are perpetrated in districts in which there is a strong infusion of English and Scotch blood with the native Irish. Tipperary, where the soldiery of Cromwell are settled, has been the centre and headquarters of the most brutal outrages; while Kerry, which is almost purely Keltic, is as peaceful as Kent or Wiltshire—perhaps more so. Ulster, where the Scotch and English settlers abound with the Irish, is the most violent and turbulent of the provinces. The mixture of the Saxon and the Keltic blood would seem, therefore, to produce a violent and inflammable compound, possessing dangerous qualities from which the separate elements are free. Here, however, the more turbulent qualities are not engendered in the Canadian compound of mixed nationalities, and violence is infrequent and crime is rare.

The Scandinavian, Celt, Slavonian, etc., have come here, *not* for the purpose of warfare, but to better their condition. All, therefore, are engaged in the same peaceful enterprises. Before this tide from the East the red man has receded. A few of the aborigines have remained and have been amalgamated with the whites ; but chiefly with the French Celts of the eastern portion of Canada, and with the Scotch Celts of the North. And this amalgamation of varied elements will produce—is producing —a homogeneous nation partaking of the more marked characteristics of the parent stocks.

I have not, hitherto, alluded to another people who, in certain numbers, here and there, have taken up their residence in Canada—chiefly in its western portions. The vertical rays of the sun of Africa had already darkened the pigment cells of the skin till its colour has become what it is. It would be interesting to speculate on the future of the negro on this continent. Even in the more southern parts of the neighbouring states he will not continue to have a monopoly of labour; while in Canada he exists with difficulty in the warm parts only, and in the colder parts not at all. As it is the vertical rays of the sun which have produced the physical changes we notice, the oblique and feebler rays of the sun of Canada will again deprive him of that colour which is now the negro's chief characteristic. But this may appear speculative, and the fewness of numbers may render any extended allusion to what may possess only scientific interest unnecessary, as well as to that other problem so often discussed, yet so far from solution—whether or not he will ever be able to take a leading position when educated. As in all tropical countries the whites must naturally be in the minority, and can exist only in the capacity of masters, in colder regions he must ever continue to be supreme in numbers and in influence.

The absorption and final assimilation of nationalities

is a slow and difficult process at all times—here, even, when effected by a more civilized and numerically superior race; but it is much slower and more difficult when effected by that brute ascendancy which numbers will alone give. It may be safely asserted, however, that nationalities which in Europe are distinct, here lose their national angularities, and dovetail more readily into each other, like the different colours and shades and gradations of colour blend on the artist's palette and form a new tint, unlike any of the constituents.

To return, however, to the question proposed a moment ago, and partially answered in the foregoing quotation: which element in the heterogene people now levelling our forests or building our cities* will be the preponderating one, or will stamp most indelibly the issue of the present stock? I shall answer: It will no doubt be much after the fashion described by Darwin† in the struggle for existence:—"If several varieties of wheat be sown together, and the mixed seeds be resown, some of the varieties which best suit the soil and climate, or are naturally the most fertile, will beat the others, and so yield more seed, and will consequently, in a few years, quite supplant the other varieties."

* It has been observed with what a swelling tide the Celtic races are pouring into the northern cities of the United States, while the residents of the larger cities—as New York and Boston—are moving westward. The latter city is growing every year more Celtic—more Irish—until now of every four births in Boston only one is American. This has induced a distinguished English writer to observe that all great American towns will soon be Celtic, while the country will continue more Saxon. But this is a problem requiring time for a solution. It is imagined by the believers in the distinction of classes, with money as the great leveller, that the distinction extends, but not so markedly, to nationalities—and who assert that the Scotch, Irish, German and (but to a less extent) the French are adding to the Americanized Anglo-Saxon mass.

† From my allusion to this ingenious writer, it is not to be supposed that I favour that theory of development which again in late years has received so much attention in the scientific world.

Where admixture takes place between the aborigines and European stock, the qualities which are most marked in either parent, and which are most generally transmitted, seem to be those which are most likely to be serviceable. In eastern Canada, as already observed, union has taken place chiefly between the Iroquois women and the French-Canadian, and the taciturnity of the red man has been warmed up and softened by the admixture. The half-breed here displays a levity and lightheartedness characteristic of the children of Old France—with, it must be added, the sometime uncontrollable passions of the Indian. In the North-West, on the other hand, the European servants of the Hudson's Bay service, who are chiefly North Britons, have united with Cree and Saulteaux women, who have transmitted many of the more marked qualities of their sires, and chiefly the "plodding, careful disposition of the Scot"—a quality in no way derived from the red man, whose passion for destroying every living thing that he meets is so deeply implanted within him, that it "costs him a pang to pass bird, beast or fish without an effort to destroy it, whether he stands in need of it or not."*

We have seen the same influence controlling the size, shape, qualities and permanence of distribution of the Canadian horse. A couple of centuries ago the Norman horse was brought to these shores. Since then the Suffolk Punch, Cob, English and American racer, Arabian pony, Clydesdale draught horse, etc., have been introduced; but, like the weaker kinds of wheat which Darwin mentions, they merge into, are absorbed and are ultimately lost in the thick-necked, rugged-maned, powerful and enduring Norman, constituting a distinct type which we now term "Canadian," and which still exem-

* How frequently, among the North American Indians, are deaths from starvation due to a wholesale slaughter of animals, destroyed in mere wantonness.

plifies the more marked characteristics of its sires. On considering these and analagous phenomena we can hardly avoid concluding, with Dr. Richard, that "the variations of animals (man included) proceed according to certain laws, by which the structure is adapted to the necessity of local circumstances."

But to return again to man, who is intended to take the whole earth under his dominion,—to become the denizen of every region that will afford him sustenance—the bountiful Parent of all things has furnished him with instinct, and with intelligence far higher than instinct, to modify *all* the external influences of our climate, and to render it subservient to his interests and his comforts. Yet must he take cognizance of the refluent action of Nature upon him. And there can be no doubt that we already—and still more will our descendants—experience that influence of climate which will fit us and them for the permanent occupation of this favoured land. But it may be asked, What change? The change will be the threefold result of acclimature; of amalgamation;* and of a Christianizing influence. The first it will be impossible; the second it will be unwise to resist; the third exists independent of all conditions of temperature.

Were I permitted to hazard a syllogism from premises partly stated, partly proved, or partly, I admit, founded upon experimental conjecture, I should say the future occupants of the soil will be a taller, straighter, leaner people—with cheeks perhaps less ruddy; eyes darker and less prominent; hair darker and drier and coarser;

*The second, amalgamation, is not destruction. The conquering Saxon has vainly endeavoured to destroy the conquered Celt. The latter holds his ground in Wales, and in the Highlands of Scotland, and even in some parts of England, as Cornwall, where the type is as distinct as in the time of Harold. But that distinction is only observable on closer examination, and presents no angularities to hinder a harmonious blending for the common weal.

muscles more tendinous and prominent and less cushioned, and covered with a darker and a drier skin; the malar bones, in fact all the bones, more prominent, giving a less rounded, a more angular appearance to different parts of the body, and especially to the face and hands, and all these physical conditions will be presided over by intellect as well favoured. This would be a people (may I hope a true Canadian people) possessing elasticity and vigour of mind and strength of body; which will have assimilated and appropriated to itself all it could not or should not reject; and with vigour, force and energy enough to have rejected all it could not appropriate.